COMPUTER AS AN AID FOR DECISION MAKING IN CLOSE AIR SUPPORT OPERATIONS

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To

my mother

(Late) Smt. LUXMI JUYAL

9.11.81

CERTIFICATE

This is to certify that the work entitled, 'COMPUTER AS AN AID FOR DECISION MAKING IN CLOSE AIR SUPPORT OPERATIONS' by Flt.Lt. D.P. JUYAL has been carried out under our supervision and has not been submitted elsewhere for a degree.

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- D.P. Juyal

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ABSTRACT

In Close Air Support operations, Army and Air Force has co-ordinated and co-operative plans to neutralise enemy's action in the battle field. A request, for this purpose is made by Army authorities to Air Force authorities. In this thesis decision making aids, utilizing the modern digital computer to the Air Force commander for Close Air Support operations are studied. Detailed consideration has been given for effective utilisation of bases, aircrafts, weapon system and pilots etc. available to the commander. The digital computer is used to assist the Military decision maker for making accurate and fast computations and arriving at various alternative mission feasibilities.

CHAPTER 1

INTRODUCTION

Tactical airwar is characterised by a series of air actions or tasks undertaken in order to accomplish some definite mission. A most important and basic decision in a tactical war is the allocation of aircrafts among various theaters of air tas

1.1 AIR TASKS:

The following are some air tasks which Air Force is require to perform

a) Counter Air Operation
b) Close Air Support
c) Air Defence
d) Interdiction
e) Reconnaiessaince
f) Air Lift

In close Air Support, targets are concentration of enemy troops or important position in order to help ground forces in battle area. This is accomplished by aerial delivery of fire power against the enemy's ground targets and further advancement of our own troops.

1.1.1 Previous Work in this Field:

An attempt to use computer for Ground Support air operations was carried out by Sqn.Ldr. SC Jain. He considered base, aircrafts and targets for joint working for Air and Ground Force Main stress was laid on organisational part of the Army and Air Force operations. Capt. DCR Mamtani, in his work on immediate

air support operations used the game theoretic approach, for alloting priorities of hit on the basis of pay off function, after assessing own and enemy's army strength. Sqn.Ldr. KK Rao in his work for Air Defence, stressed on priorities of employing defence weapons against enemy's counter air operation

This work deals with decision making for close air support operations, under the consideration of many factor discussed in subsequent chapters. The present work can be considered to be an extension of the work of Sqn.Ldr. SC Jain and to complement the work of Capt. DCR Mamtani.

1.2 STATEMENT OF PROBLEM:

In the present work, role of Air Force Commander for decision-making for close Air Support operational, aspect of airtask has been studied. The digital computer is used to assis the commander for accurate and fast calculations and arriving at various alternative mission possibilities for the operation. Detailed consideration has been given for effective utilisation of bases, aircrafts, weapon system and pilots available to the commander.

1.3 RELATIONSHIP OF ARMY AND AIR FORCE:

The relationship of the present tactical Air Control System and the army units it supports, is shown in Figure 1.1, for a typical army corps area of responsibility in a joint task force operation. The crops front or forward battle area

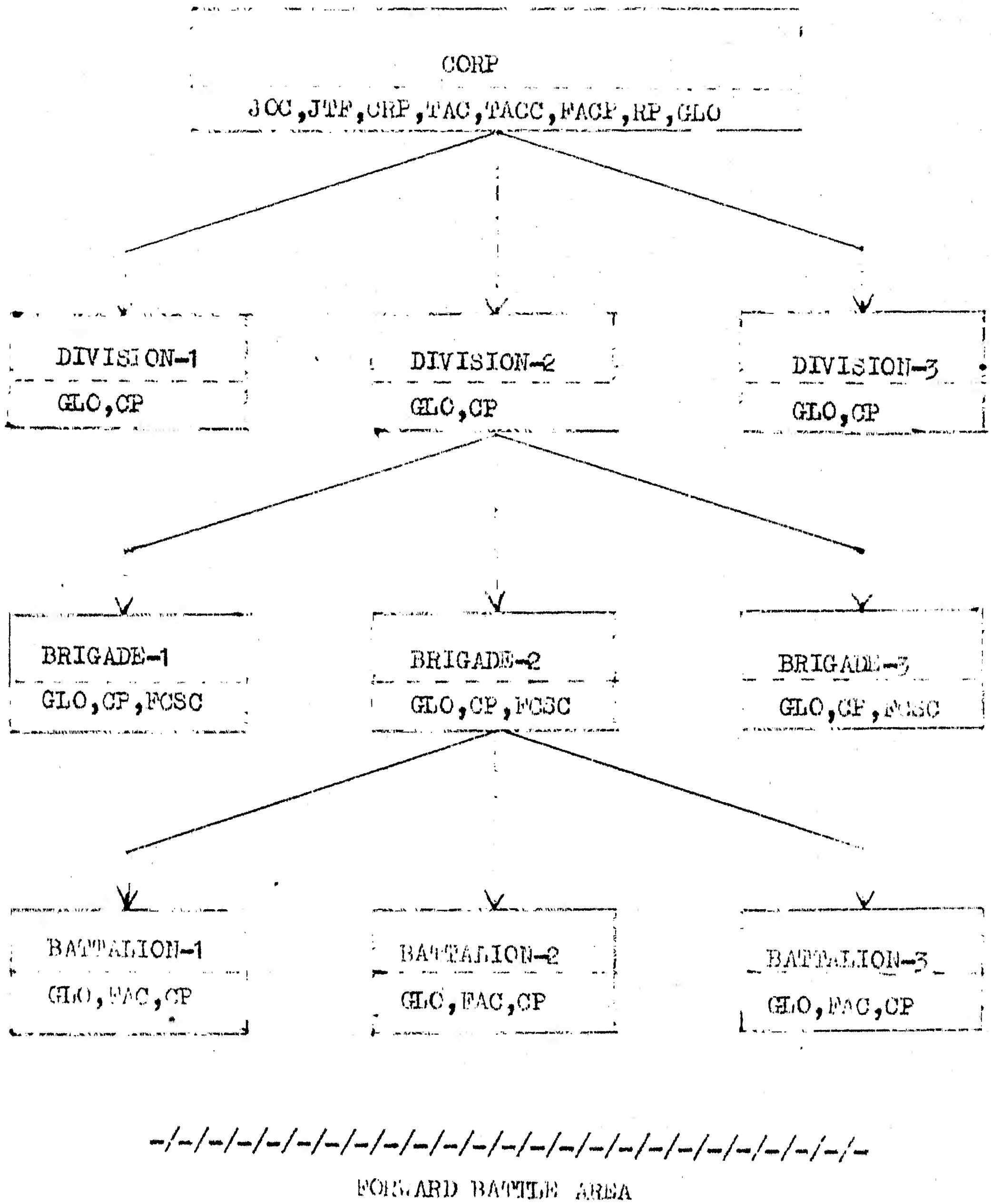


Fig. 1.1: ARMY CORP'S AREA OF RESPONSIBILITY

might be 30 to 80 kilometers in width. The corps consists of atleast two divisions. Each division contains of three Brigades and each Brigade of three Battalions.

Air Force probably would provide air defence and air control elements such as the control and Reporting center and control and reporting post. Other Air Force element would likely be Tactical Air Control Center (TACC) associated with Air Force Command post and a Direct Air Support Center operating with the Army's Tactical Air Support element. At corps' level Tactical Operation Center (TOC) is established. Air Force element is present at the level of army formations. At battalaion level Air Liason Officer (ALO) and Forward Air Controllers (FAC) are present.

After assessing enemy location and capabilities, plans are formulated to neutralise it. A request for this purpose is made through proper channel to the air authorities. There are two kinds of such requests.

(a) Preplanned
(b) Immediate

The preplanned request for mission is made from ALO at Battalion level, Brigade and Div. commander's post. These request reflect co-operative and co-ordinated planning between army commanders and their air force advisors at various levels of field command. Normally a period of six to twenty four

hours or more may elapse between the time of a preplanned request and execution of the mission.

Immediate request for air support can be made by FAC and ALO's at battalion's level.

For a conventional division there are about 9 FAC's and 13 ALO's. Thus it is possible that request for immediate air support could come from 22 different sources and at corp's level from sixty six different sources. Hence making a meaningful decision for such a big demand at one time is a difficult task; whether a request is to be accepted or not,is at the discretion of air force commanders. To process these requests for the maximum number of feasible solutions to help commanders in decision making, a computer would be required.

1.4 PROCESS OF DECISION MAKING:

In decision making we require an identification of a set of alternative courses of action.

$$A = [A_1, A_2, A_3, \ldots\ldots A_n]$$

In order to select the best suited solution out of these alternatives, the decision maker must apply some criterion for each alternative Ai, it is assumed that there is some calculable cost function K(Ai). In Military application our objective is to minimise cost or losses, while achieving a stated system objective.

1.5 DECISION MAKING FOR AIR ACTION:

Air action against an enemy is a planned task. Thus the techniques which are used for taking decision in operational problems are relevent in air action, in air action the situation does not remain static, but changes with time. Hence the method employed should take into account the changing situations.

The only way to deal with such a complex situation is to resort to the use of a computer as an aid in decision making. The number of variables involved and the complexity of the decision making problem are usually such that, inorder to save computational effort and storage, well designed and efficient computational procedures are essential.

1.6 SYSTEM ANALYSIS AND MILITARY DECISIONS:

System Analysis in the context of Defence Planning and strategies implies any systematic approach to the computation and evaluation of alternatives. It can involve evaluations done to aid the decision maker. Hence one can conclude it as "Inquiry to aid a decision maker, choose a course of action by systematically investigating his proper objectives, comparing quantitatively, where possible the effectiveness, cost and risk associated with the alternative policies or strategies for achieving them and formulating additional alternatives, if those analysed are found wanting". In the military context it is

used to represent an approach to or way of looking at complex problem like tactical airwar where variables and constraints are too many and choice of the best suited alternative is the aim.

In the present work, for close air support, efforts have been made to formulate the problem inorder to compute and arrive at a best suited solution out of the many alternatives, by a systematic procedure.

1.7 EFFECT OF ENEMY'S STRATEGY ON OUR DECISIONS:

Our strategy must stem from what we think the enemy's strategy is. For this type of situation, there are essentially two approaches, namely

(a) Game theoretic approach

(b) War games

In game theoretic approach we study the situation of conflict. This theory is used to develope games, to study the possible strategies against enemy's counter strategies. On the other hand in war gaming we study a dynamic simulation of military combat executed in such a way that one or more human participants can exercise control over the activities of simulated force. In war gaming when we simulate a problem, we consider all alternative to arrive at best suited solution against enemy's disposition.

1.8 ELEMENTS OF DECISION IN TACTICAL AIR OPERATION:

It is necessary to consider various factors in arriving at a decision for tactical air operation. Air crafts have different configurations, speeds, ranges, military load capacities operating altitudes, offensive and defensive capabilities, delivery accuracies and cost effectiveness. A tactical air operation has the following structure.

Men+Logestic support+$\begin{matrix}\text{strategy}\\ \text{tactics}\end{matrix}$	v/s	Men+$\begin{matrix}\text{Logestic}\\ \text{support}\end{matrix}$ + $\begin{matrix}\text{strategy}\\ \text{tactics}\end{matrix}$

Thus we have to examine all possible manpower, weapon, equipment, vehicle and geopolitical situations, strategies and tactics that might be employed by both the sides in the operation. It is thus necessary to consider the decision making process as shown in flow chart of Figure 1.2.

(a) Situation and Objectives:

Tactical analysis is mostly undertaken with only partial information about the objective and criteria. Thus it is necessary to choose the right objective and then to make the right choice from the alternatives available.

It is felt that the tactical air operation problems are highly complex; therefore these problems are mostly dealt with by factorising them into subproblems, since there are no set mathematical tools for direct application to the entire problem.

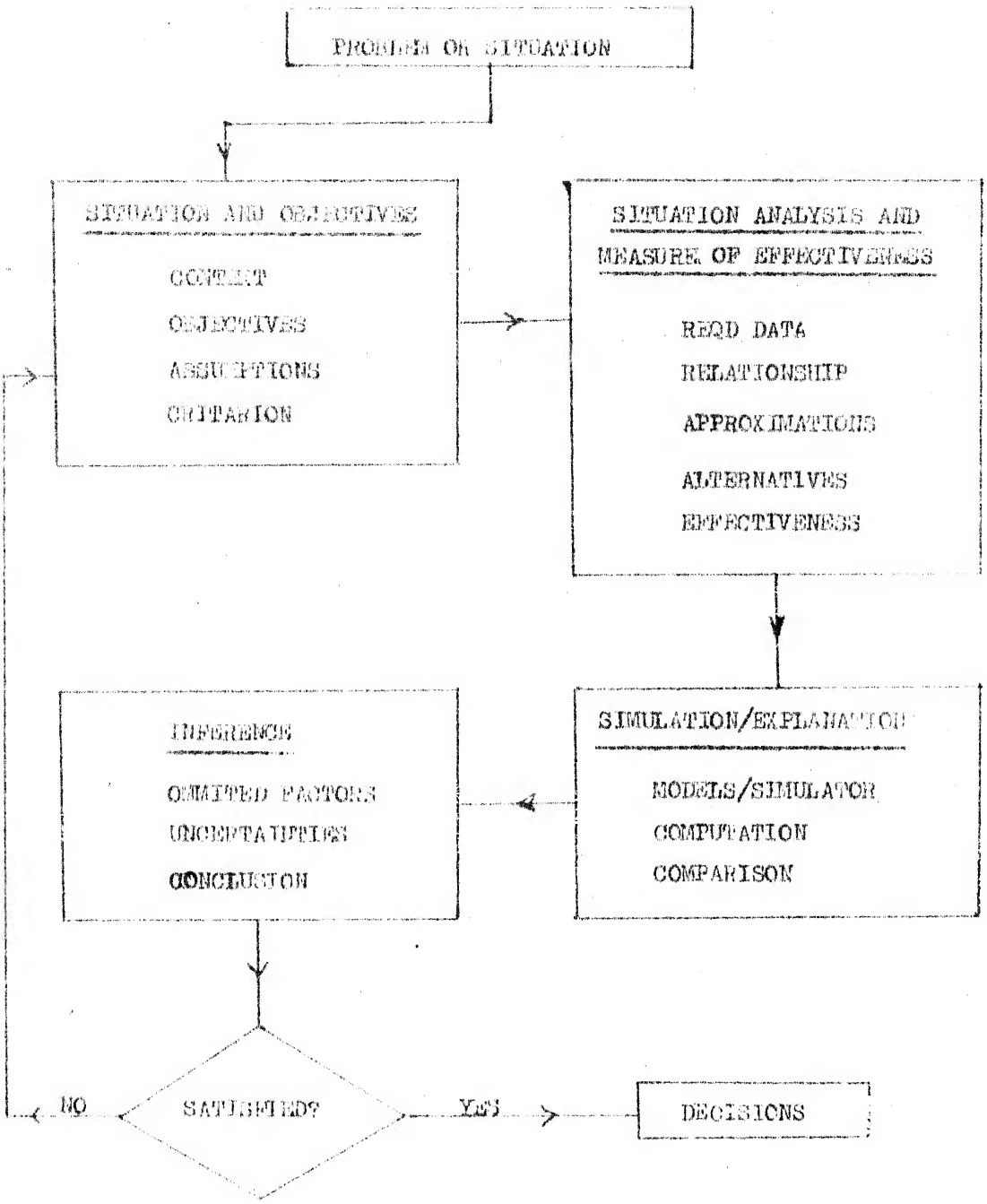


Fig. 1.2: DECISION MAKING PROCESS

Once the complex problem is broken down into parts, these parts can then be analysed using various available techniques.

(b) Situation Analysis and Measure of Effectiveness:

In military problems, all facts are never known, under such conditions, the commander must arrive at decision without the full knowledge of all the facts and also of the potentialities of modern scientific approach.

A mathematical model must be designed stating the fundamental transactions taking place between those opposing systems. It contains terms which express the important variables in the Airborne equipment. The purpose of measure is to provide a means by which one may determine the individual efficiencies of a whole series of candidates for accomplishing the specific airborne mission.

The situation is analysed keeping in mind the relevant data required and their relationship. To fit these data in mathematical form we need to make approximations.

(c) Explanation:

Once the commander knows facts and alternatives, it is he who has to build up a way to explain them and to know their implications. He has to prepare models, which depends on the question being asked. It is not possible to represent a situation by mathematical model every time, because factors

like morale, intuition, human relations cannot be set in mathematical forms. A computing machine may or may not be useful depending on the problem and the extent of our informations.

A commander thus does not have and cannot be expected to have the flexible and accurate means available to physical scientists for testing his model experimentally. A commander cannot do experiment of actual war but he can test workability of war.

(d) Inference:

Once the solution of a model is obtained, it must be interpreted in the light of considerations which may not have been adequately treated by the model. In military problems many factors used in computation are not and cannot be measured. This may be because of time limitation or enemy's defence strength and man machine combination are not accessible to measurement but have to be assessed on the basis of experience or pooled judgment. Thus while selecting best solution out of a set of alternatives military commander should pickup the alternative which he finds ranked highest by the model. In case for any reason he finds orintutively feels some other alternative to be best he can do so, since he is the final authority in that matter. Moreover if he finds that results are not upto his satisfaction he can analyse the whole situation again.

CHAPTER 2

COMMANDER'S RESPONSIBILITY

In this chapter qualities and ideas, which enter in military decision-makers mind will be discussed. A commander selects the course of action which offers the greatest promise of success. The factors he should consider to arrive at right decisions will be discussed in this chapter.

2.1 COMMANDER'S ROLE:

A commander has to assume that enemy can discover his decisions and will adopt the most effective strategy in opposition. Thus a military commander knows that the outcome of a particular decision will depend not only on his choice of an alternative,but also on facts beyond his control. The man machine system being studied in the present work has its functions constrained by uncertainties of various kinds.

If commander's evaluation of a situation is incorrect his decision may be in error regardless of the way he arrives at this decision. However if his evaluation is correct he gains a certain assurance by basing his decision on his enemy's capabilities. While selecting strategy for such actions commander assigns a carefully chosen probability to the success of each strategy. If commander is going to make many similer decisions, he should risk a loss, provided it gives an expectation of gain.

A commander requires all the possible aid from advanced problem solving procedure. It has been found that too many commanders rely only on intuitive methods, that were satisfactory in the past. They have not yet realised that this is out moded in the modern complex situation and that the utilisation of the available tools of science and technology must be combined with intuition developed through experience. Thus the commander should have the benefit of the sophisticated management techniques when individual plans and set of objective covering proposed strategy, tactics and weapon systems are submitted to him. The commander has the responsibility for the final decision that determines whether the proposal is to be subjected to operational cycle.

2.2 COMMANDER'S APPROACH:

A military commander should have a systematic approach to the situation under consideration. By this we mean he must attempt to look at the problem as a whole and must examine more than one performance criterions to make a wise recommendation. He must consider such operational and logestic factors as mobility, data requirement, communication, supplies, maintenance, personnel and training.

2.3 COMMANDER'S INTUITION AND JUDGEMENT:

We know that intuition is alternative to analysis. Intuition is a species of logical analysis and uses models from our sense of reality.

Human judgment and intuition also enter in usual situation but not in so explicit a fashion. In order to analyse a situation models are made to decide which factors are relevent to the problem and their interrelationship. Human mind has capacious memory, which enables us to learn from experiences. It has remarkable facility for factorising out important variables and suppressing the rest.

Now with the modern scientific approach and methods to solve problems it is insufficient to depend on intuition alone. We should have some kind of computer analysis, since modern air-war problems are too complex to be left to intuition alone. Intuition and analysis if properly used compliment each other. Hence it is clear now that computing techniques enable a commander to do things, he otherwise could not.

2.4 COMMANDER'S ACTION IN AIRWAR:

The commander and staff of Air Force consider a number of contigencies in tactical planning of an air operation. These include various means of achieving the objective; the relative strength of own and hostile forces, terrain, morale, weather etc. and the various means the hostile forces might take to counter the operation. On the basis of estimates of the effectiveness of particular means of achieving an objective relative to the various counter measures that the hostile

force might take, the commander will select a course of action that he considers to be best overall.

An Air Force commander has to take two kinds of decisions depending upon the situation:

(a) Tactical Decision

(b) Strategical Decision

Tactical decisions are lower level decisions, while strategic decisions are decisions with long term implication like that of cost and resources.

2.4.1 Tactical Decision:

Tactical decision relating to Air Force deals with:-

(a) ATTACKING; i.e.

(i) When to attack

(ii) How much to attack

(iii) Whom to attack

(b) PLANNING ; i.e.

(i) How much of each attack to make in a time period.

(ii) When and in what preference to attack within the war planning period.

(iii) How much air effort is required to each sector and at what frequency.

(iv) In multirole aircraft operations how to plan distribution for minimum transportation.

(v) How many aircrafts, transports and other allied equipment will be required for operation for limited number of days.

2.4.2 Stratigic Decision:

Stratigic decisions deal with budget, cost, availability of resources and their allocation. They are higher level decisions.

2.4.3 Mixed Decision:

This portion deals with decisions having both tactical and strategic aspects, that is,

(a) At what rate to attack in close air support and deep penetration.

(b) What cuts or savings of sorties to allow for having demands.

(c) What should be policy of training and briefing.

An Air Force Commander thus has gathered sufficient confidence in his intuition and common sense from the success of his previous decisions. He either considers decision to be straightforward and simple or he considers it necessary to take the aid of Modern operational research, management, game theoretic and optimization techniques.

CHAPTER 3

COMPUTER AS AN AID

In solving complex operational problems a model is often used. The reliability of the results obtained however depend on the characteristics of the simplification which necessarily are made in drawing up the model. In modern times there is little opportunity for commanders to learn from direct warfare experiences. Therefore it becomes necessary to formulate our plans and test them link by link, part by part, in the greatest detail so as to take care of all possible eventualities during actual action.

3.1 TIME CONSIDERATION:

Now the number of such details are so many that it is rather impossible to go through each and every one manually and give proper weightage for calculation. Moreover the model becomes so large that it will take months to solve it by hand. If one could reduce this period considerably, one can arrive at a better conclusion or decision. Thus the need for a computer arises.

3.2 COMPUTERS CHARACTERISTICS:

A computer however high speed it may be alone does not solve the problem of military decision maker. It only executes a series of instructions. Computer solution depends

upon how well the problem is defined, the criterian selected and the objective stated. Computer has the advantage that it is fast and reliable. We may say that the computer enables the user to examine his problem in greater detail that can be done manually.

3.3 ROLE OF COMPUTER IN PRESENT WORK:

This work is an attempt to simulate an interactive programming model for Close Air Support operation to help an Air Force Commander to arrive at a fairly good decision by using a high speed computer. It is programmed to consider the detailed activities of base operation, selecting aircrafts for mission, consider range, weather, time, distance, selecting optimum route for operation, refueling, damage by enemy's defence, bomb damage to enemy's disposition and restriction of operation by fall out within the concrete limitations of geography, forces available, aircraft characteristics defence effectiveness, base capabilities, target and weapon effects.

The model starts with a set of initial conditions namely base, aircraft, target details, pilots availability data, probability of hit on enemy targets and weather conditions. The present model should be used by an experienced commander who understands its capabilities and limitations.

3.4 NEED OF COMPUTER SIMULATION:

The advantage of computer simulation is that many trials could be repeated to obtain fairly large samples in a reasonable time. A tactical decision algorithm which is supposed to emulate the response of commanders and staff to the flow of tactical information was considered fundamentally inadequate to the purpose. The computerised decision cannot be hoped to reflect the variety of considerations that enters a commanders decision process. Factors of terrain, weather, progress of units, hours remaining to day light or night fall and present strength and disposition of enemy force, and many other factors enter the commanders decision. In addition there are questions of tactics such as when and where to put reserve, wether to reinforce a defensive line early or to wait and then counter attack and when and where to apply main attack efforts. These questions are too complex to be reduced to a few computational rules.

Computer keeps all records, maintains the data base, performes the numerical assessment and generates all standard format reports to the commander.

The controller who is to assist commander in computer work maintains the situation map, interprets and takes orders

for implimentation and initiates all computer assessment and reviews the computer outputs.

3.5 COMPUTER SYSTEM AVAILABLE:

DEC system 1090 computer, installed at IIT Kanpur was used to run the program. Some of the salient features of the system are;

(a) External Memory Cycle Time : 1200 n sec

(b) Core Memory : 256 K word of 36 bites each

(c) Time sharing facility with 20 TTY's connected.

System configuration includes two 600 lines per minute line printers which were used for printing the results.

3.6 SOFTWARE DEVELOPMENT:

The software includes main program and twelve subroutines, and four data files.

3.7 TIME AND MEMORY CONSIDERATION:

The program is written in FORTRAN-10 language and implemented on DEC system 1090 computer. All the timings and Memory requirement are corresponding to this system.

(a) Program Storage

i) AIRACT.FOR : 36.57 K bytes

ii) SUBROT.FOR : 3.7 K bytes

b) Compilation data using;

i) Memory requirement : 31.41K bytes

ii) Run time : 3.18 sec

c) Program Execution;

ii) Command Processing Time : 9 m sec (average)

ii) Action Processing Time : 424 m sec.

iii) Memory required during execution : 32 K bytes (for program example)

It must be noted that these timings and memory requirem will vary depending upon the number of times the commander interactsto modify the solution given by computer.

3.8 TYPE OF COMPUTER REQUIRED:

For running this program any general purpose computer having the following facility could be used;

a) Memory of : 32 K bytes

b) Terminal (TTY) for interactive use

c) Line printers for printing results.

CHAPTER 4

DISCRIPTION OF MODEL OF THE DECISION MAKING PROCESS

The present interactive programming model for close air support, which describes in detail the procedure by which an optimal choice of base, aircraft, and weapon system is made to neutralise the enemy disposition and further advancement of our own troops, has been divided into the following three sections:

SECTION 4.1: STUDY OF VARIABLE:

This section contains 4 subsections,

Subsection 4.1.1 - Study of close air support request.

Subsection 4.1.2 - Study of base, aircraft, target, weather and crew status.

Subsection 4.1.3 - Process algorithm on the basis of demand in subsection 4.1.1.

Subsection 4.1.4 - Study of direct and indirect possibility of mission.

SECTION 4.2:

This section deals with target and weapon allocation.

SECTION 4.3:

This section is divided into 3 subsections.

Subsection 4.3.1 - Study of overall mission possibilities

Subsection 4.3.2 - Decision Making by commander.

Subsection 4.3.3 - Selection of final mission and updating dat

The overall flow chart for the complete decision making process is given as Figure 4.1.

4.1.1 Study of Close Air Support Request:

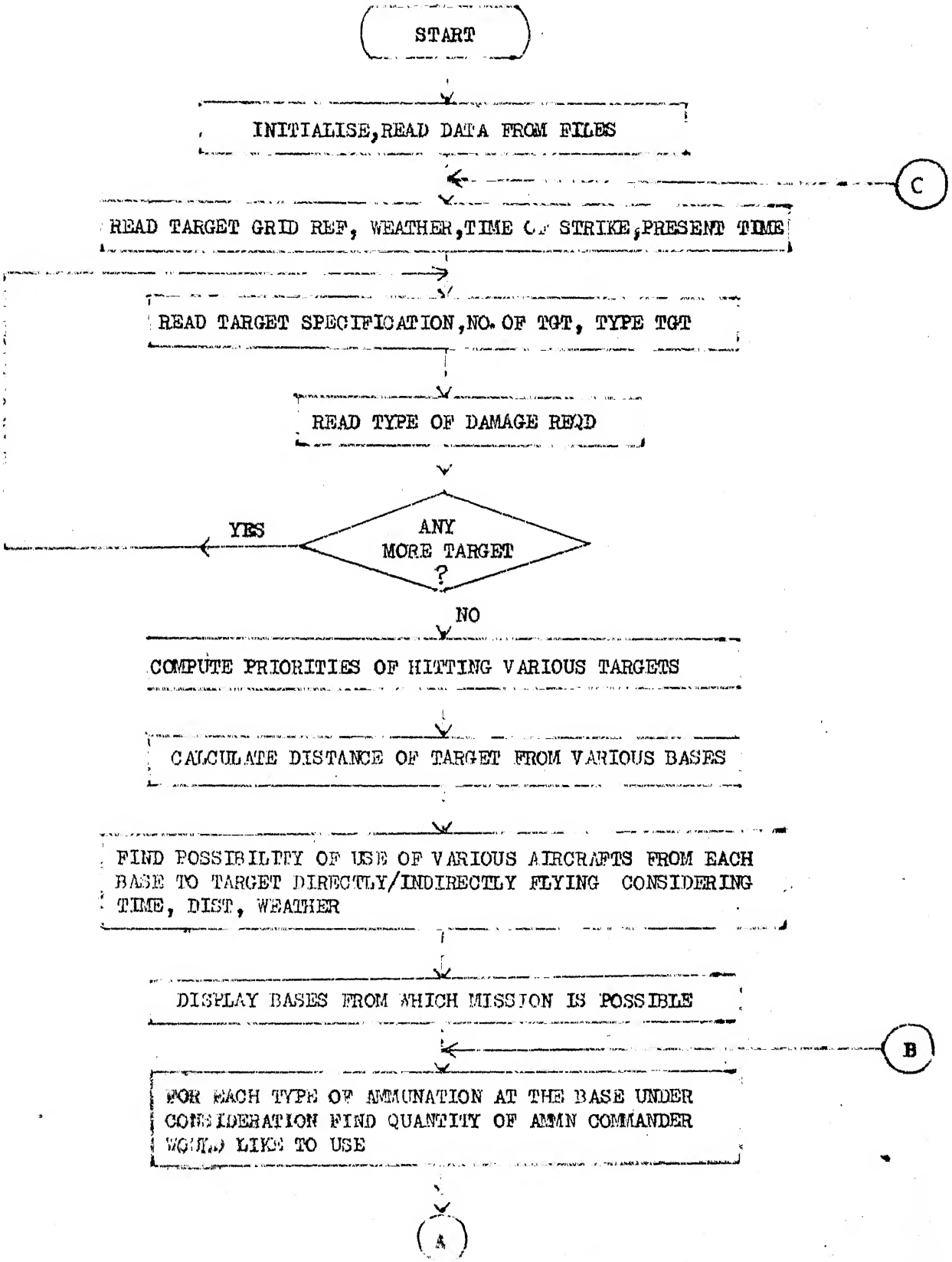
This is the final report which is raised by the army authorities from a theater of war, for air support to advancement of own troops, by causing damage to the enemy's dispositions The details in this request are "INPUT" for decision making by Air Force authorities to meet the request in time. The format of one such request is shown in Appendix 'A'. It contains location of target,giving map details of the area and exact six figure grid reference of the target, time at which air support is required and the present time, types of target and their numbers and the desired type of damage required.

4.1.2 Study of Base, Aircraft, Target, Weather and Pilots:

This phase is concerned with the selection of base, aircraft, target specifications, weather condition, and pilots status.

4.1.2.1 Base System:

In the present work a set of bases have been considered, which are directly under the control of a sector Air Officer.


START
INITIALISE,READ DATA FROM FILES
C
READ TARGET GRID REF, WEATHER,TIME OF STRIKE,PRESENT TIME
READ TARGET SPECIFICATION,NO. OF TGT, TYPE TGT
READ TYPE OF DAMAGE REQD
ANY MORE TARGET ?
YES
NO
COMPUTE PRIORITIES OF HITTING VARIOUS TARGETS
CALCULATE DISTANCE OF TARGET FROM VARIOUS BASES
FIND POSSIBILITY OF USE OF VARIOUS AIRCRAFTS FROM EACH BASE TO TARGET DIRECTLY/INDIRECTLY FLYING CONSIDERING TIME, DIST, WEATHER
DISPLAY BASES FROM WHICH MISSION IS POSSIBLE
B
FOR EACH TYPE OF AMMUNATION AT THE BASE UNDER CONSIDERATION FIND QUANTITY OF AMMN COMMANDER WOULD LIKE TO USE
A

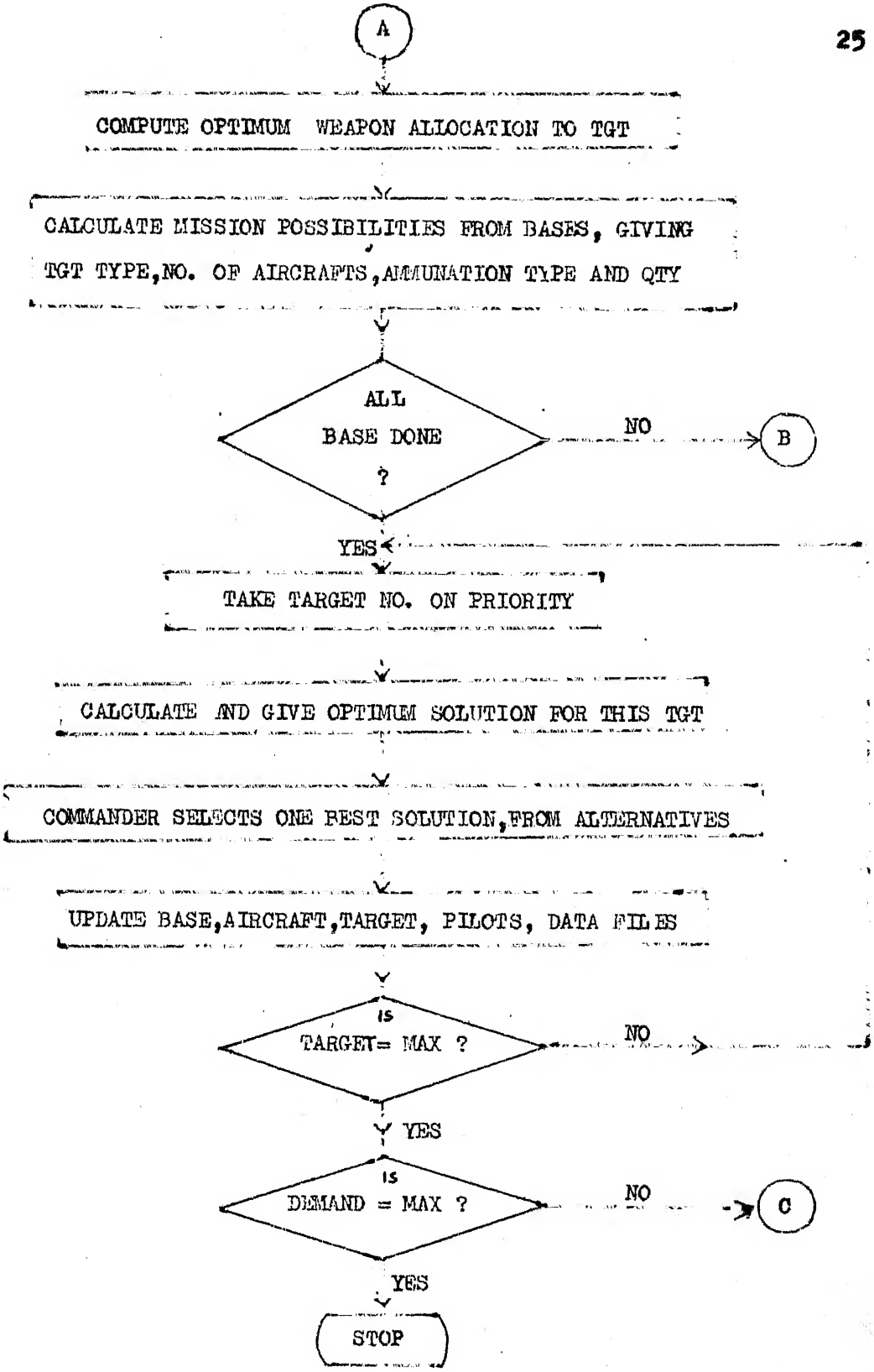


Fig. 4.1: OVER VIEW

Though provision has been made for consideration of any number of bases, for the purpose of the present study only five air bases have been considered under one commander.

We know that in order to achieve our aim, the operational requirement of a fighter or bomber force are easy to express and difficult to attain because:

(a) Air support force must have the ability to reach the designated target; this however depends on range, penetration and navigational problems.

(b) Attack on enemy's disposition should be as specified in air request.

(c) Aircrafts detailed for operation must be able to return to base without suffering more than bearable losses.

Thus while considering base selection, the following distances were assumed critical and important.

(a) Direct distance from base to target

(b) Nearest base from the target for indirect operation.

The present analysis has been carried out keeping inview the joint effect of these respective factors.

It has been found that operating air effort depends on the aircrafts, on the radius of operation of aircraft and on the method of radius of extension chosen.

The status of each base consists of relevent details required for analysis, shown in Appendix 'B'. These bases are represented on the six figure grid reference map shown as Figure 4.2. These base locations are fixed throughout the study. It is considered that bases of strategic importance are kept away from enemy's striking power. This has been done by extending aircrafts operating radius by a system of refueling. The base nearest to the enemy striking zone is mostly used for landing, takeoff and high speed refueling facility. Very little or nil amount of weapon, aircrafts and pilots are positioned at such bases. The sole consideration of having such a base is to increase the flight radius to enemy target, and indicates the desirability of operating from bases which are as close as possible to the target.

In the present analysis base number five is close to the enemy zone and for most of the operations it has been used as a "HOPPING" base. It has been assumed to have night landing, refueling, air traffic control, and maintenance support facilities. It has a small amount of ammunition for emergencies.

In the present work the main programme takes various details of bases from 'DATA' file and uses them as and when required.

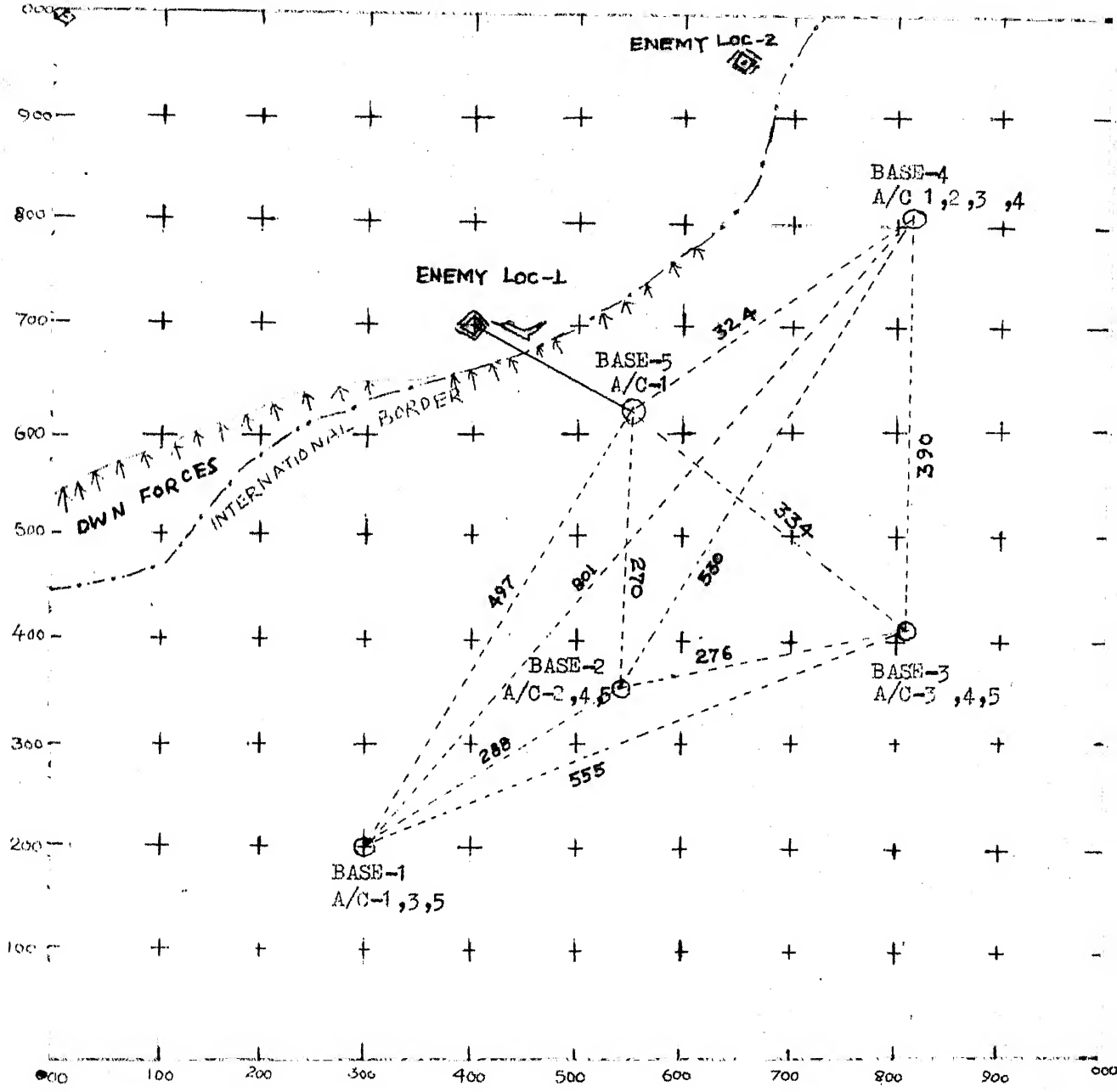


Fig. 4.2: Situation Map

4.1.2.2 Aircraft System:

Aircraft is an essential element in war. Basically there are two kinds of aircrafts, which are used for close air support operations.

(a) Fighters

(b) Bombers

The utilisation of these aircrafts, depends on the type of situation, under consideration. For the purpose of the present study five types of aircraft have been considered. They are positioned at various bases. All types of aircrafts may or may not be available at one particular base. Assumed details regarding there numbers, type of weapons and carrying capacity, time within which they can be avilable for take off, speed, range, whether they are fitted with electronic counter measure and electronic counter counter measure facility and their refuel time are given in Appendix 'B'. It is assumed that aircrafts are fit for flying. Aircrafts under maintenance in hangers have not been included in the present study. The 'DATA' file regarding aircraft status is updated frequently as and when required depending upon any variation of data.

4.1.2.3 Target Details:

In the present programme target and weapon details are essential, to calculate the optimum amount of ammunition which an alloted aircraft is to carry for a desired amount of

damage to target assigned. For the purpose of present analysis five types of ammunition and ten types of targets have been considered.

Each target type has certain worth to attacker and called as value of target (VOT). In order to calculate the value of the target and its priority of hit each target has been assumed to have some 'TARGET STRENGTH'. This target strength indicates to us the importance of this target for distruction. Target details are given in Appendix 'B'.

4.1.2.4 Weather Consideration:

Weather plays an important role in air operation. It puts severe constraints on our air operation planning. Aircraft characteristics and pilots performance are directly related to the weather. In bad weather not a many types of aircrafts can fly.

The weather forecast over any location is directly available from meteorological department, which is located at every base. Determination of the global weather condition and local variation at any time and location in battle area is Commander's responsibility. Weather assumed in the present program is the forcast over the geographical location at the time of attack over enemy. Any variation over enemy zone at the time of take-off of aircrafts can be taken care in the calculation.

4.1.2.5 Assumption of Weather Data:

Weather has been categorised in ten categories depending upon visibility in meters as below.

Weather condition	Visibility in Meters
(a) Clear	15,000
(b) Lowcast	13,000
(c) High cast	10,000
(d) Haze	2,000
(e) Light rain	500
(f) Moderate rain	300
(g) Heavy rain	50
(h) Light fog and dust	500
(j) Moderate fog and dust	300
(k) Heavy fog and dust	50

Each type of aircraft has certain characteristics to fly in different weather conditions. In 'DATA' file weather '1' represents that a particular type of aircraft is clear to fly under the existing weather condition and '0' represents the aircraft cannot fly in that type of weather.

4.1.2.6 Pilots Status:

Aircraft has to be flown by a human pilot, with all his limitations. Aircraft has to be capable of taking off

and landing on the airfields available and perhapes in bad weather condition. The number of crew required per aircraft depends upon the role of the aircraft. Aircrafts requiring more than one crew member are to assist each other for various tasks to be performed inside aircraft while flying.

Now it is seen that aircrew availability is an important function for effective use of aircraft and to meet any threat in time. Various factors are considered while determining the aircrew availablility. They are given below:

(a) Number of sorties and number of aircrafts scheduled per sortie for a given period.

(b) Size of a crew - this depends upon the type of aircraft and its role.

(c) The type and duration of a particular sortie, i.e. if two sorties overlap, the crews flying the earlier one will not be available to fly the later one.

(d) The time of the day and weather condition, i.e. night time sorties would require more crews per aircraft than day time ones, as availability of a given crew would likely be smaller at night than during the day. Weather is an important factor which affects aircrew readiness and aircraft performance.

Mission can be performed better under good weather condition. For flying in rough weather Master green pilots are required.

In the present work two kinds of aircrew categories have been considered.

1. Main crew
2. Stand by crew

The main crews are in a very high state of readiness flying, because they are directly available and the required number per aircraft is also given. The readiness state of an aircrew is its capability to fly a give mission at a particular point in time. The probability of availability of Main crews would be very high. On the other hand stand by crews are those that have either just returned from a mission or ordered to be available, they are in a low readiness state and the probability of such a crew to take up a mission will be low.

Pilots available on the base and crew structure per aircraft type is shown in Appendix 'B'.

4.1.3 Process Algorithm on the Basis of 'Demand':

After the data files are taken in by the computer, it first calculates the distance between the bases.

Now the computer is ready to accept data from Air Support Request form. Computer asks to give:

(a) Six figure grid reference of the target.

(b) Weather over the enemy zone, which is available with commander from meteorological reports.

(c) Time at which strike is required over enemy.

(d) Present time.

The time is given in six figures, such as 220430; it means on 22nd of this month at 0430 hours. Now computer program is ready to accept target details, such as

(a) Type of target (TOT)

(b) Number of targets (NOT)

(c) Type of damage required over it.

The present program has been developed to cater for 10 types of targets, the details of which are given in the Air Support Request form. It is generally not necessary to completely distroy the target. Our purpose is to cause enough damage to enemy disposition to enable our ground forces to advance. For this purpose four degrees of damage have been considered;

(a) DESTROY - 1

(b) INTRIDICT - 2

(c) NEUTRALISE - 3

(d) HARASS - 4

This degree of damage will affect our choice of ammunition as well as number of aircrafts.

To calculate priority of hit, we first calculate value of target (VOT):

$$VOT = \frac{\text{'Target strength' for type of target}}{10.0}$$

and the total value of target (TTV) is calculated from VOT as

$$TTV = VOT * NOT$$

where NOT is number of such targets to be distroyed. In case TTV is more than ten, the program rejects it by giving 'DEMAND TOO BIG, CANNOT BE TAKEN'.

The target having highest TTV is given priority of hit number one, and likewise for other in decending order and puts these values under column priority of hit (POH). The program flow chart is given in Figure 4.3.

The target kill probability data which are calculated on the basis of firing practice of pilots over each type of target for different type of ammunition is already stored in the computer as a file.

The program is now ready to calculate ammunition requirement on the basis of priority of hit, probability of hit and target value. This part is explained in detail in Chapter V.

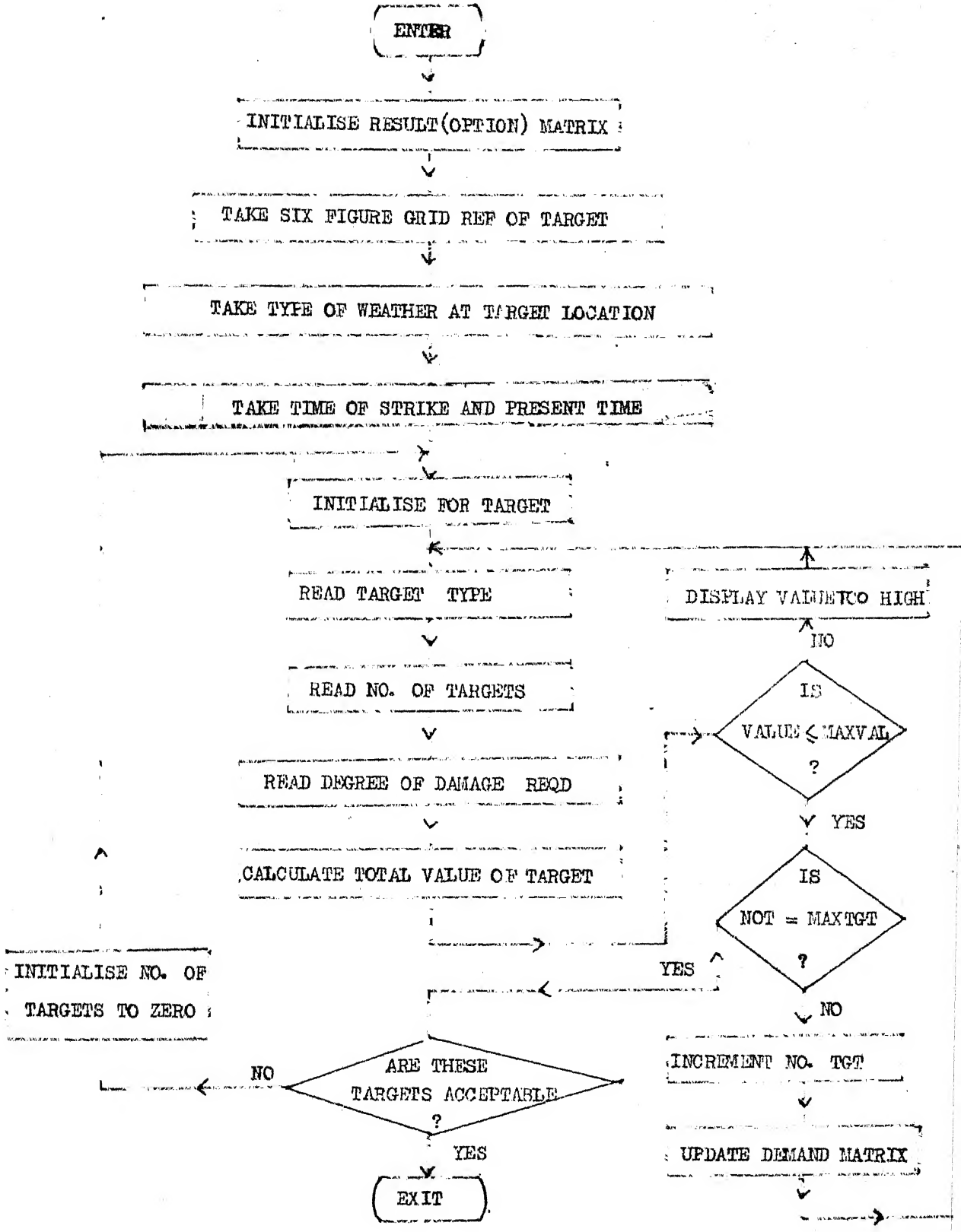


Fig. 4.3: TAKE DEMAND

4.1.4 Study of Direct and Indirect Possibilities of Mission:

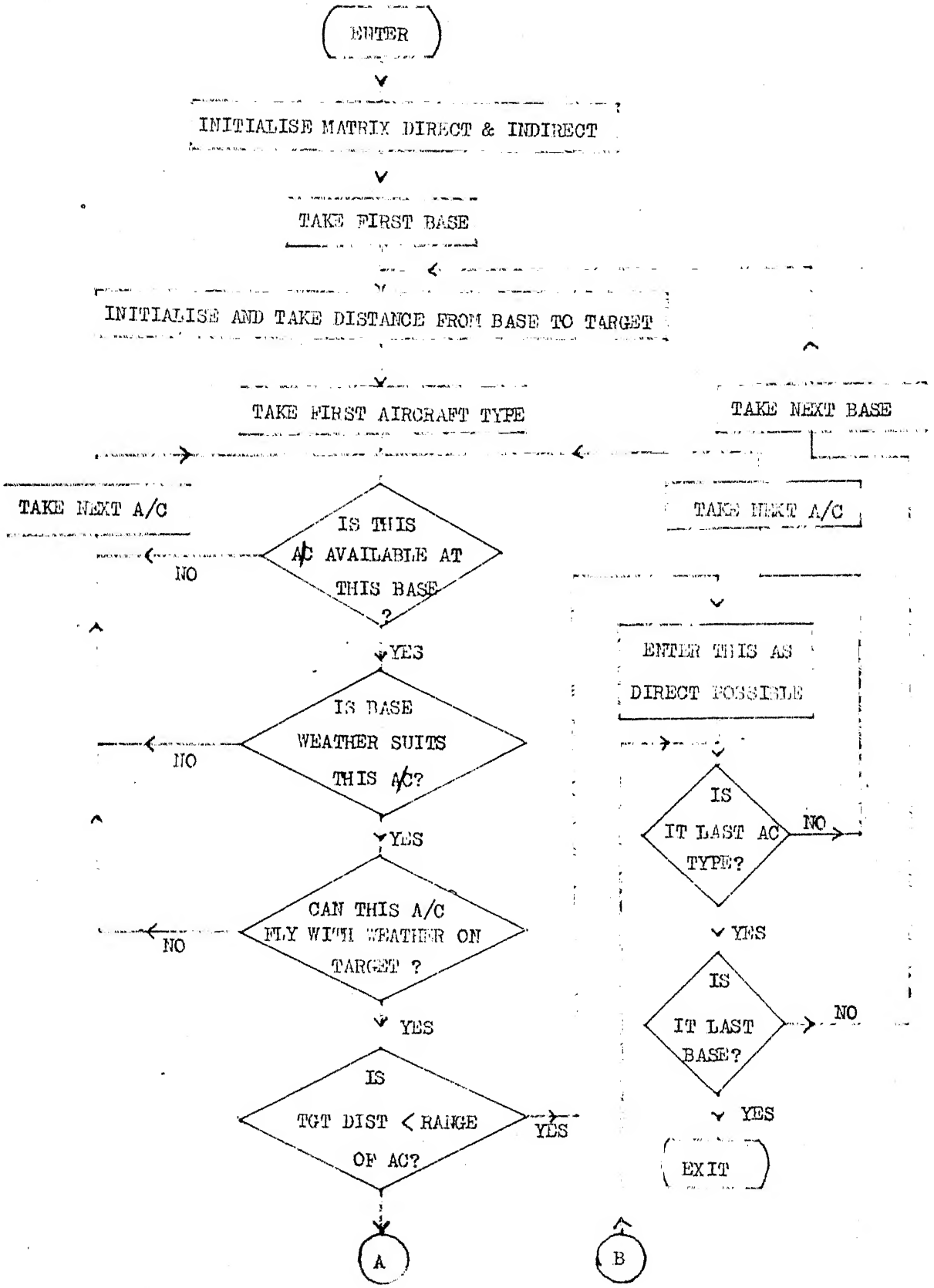
Knowing target and base locations, the distance from base to target is calculated for each base.

In this phase our aim is to determine maximum possibility of reaching to target either directly from the base or indirectly i.e. using another base for the purpose of refueling, thus called 'HOPPING BASE'. For this purpose we have to consider range of aircraft, takeoff time, refuel time at next base and total run time of the aircraft.

For the purpose of mission possibilities consider the first base and aircraft type one. Checkup whether this aircraft is available at this base; other wise check for next aircraft type. Check whether the available aircraft can fly under prevailing weather conditions at base and over the target. Now at this stage check whether range of aircraft is more than the distance of target from this base; if so this information is stored in a matrix called 'DIRECT MATRIX'. The column of this matrix are base numbers and the value in each column shows the type of aircraft. This sequence is repeated for all types of bases.

In case the direct mission possibility fails, next step is to check for indirect possibility. The program is similar to the case of 'DIRECT' mission possibility but

considers two bases at a time; i.e., one as parent base and another as hopping base. While selecting aircraft type for this, checks are made for refueling facility, weather constraints, night landing facility (for purpose of this program night is assumed from 6 P.M. to 6 A.M. next day). In case all these 'IF'S' are satisfied then the information is stored in INDIRECT MATRIX whose columns are bases, rows are type of aircrafts and figures in it shows the 'HOPPING BASE' used for the mission. Flow chart for direct and indirect is given as Fig. 4.4


ENTER
INITIALISE MATRIX DIRECT & INDIRECT
TAKE FIRST BASE
INITIALISE AND TAKE DISTANCE FROM BASE TO TARGET
TAKE FIRST AIRCRAFT TYPE
TAKE NEXT BASE
TAKE NEXT A/C
IS THIS A/C AVAILABLE AT THIS BASE ?
NO
YES
TAKE NEXT A/C
IS BASE WEATHER SUITS THIS A/C?
NO
YES
CAN THIS A/C FLY WITH WEATHER ON TARGET ?
NO
YES
IS TGT DIST < RANGE OF AC?
YES
A
ENTER THIS AS DIRECT POSSIBLE
IS IT LAST AC TYPE?
NO
YES
IS IT LAST BASE?
NO
YES
EXIT
B

Contd..

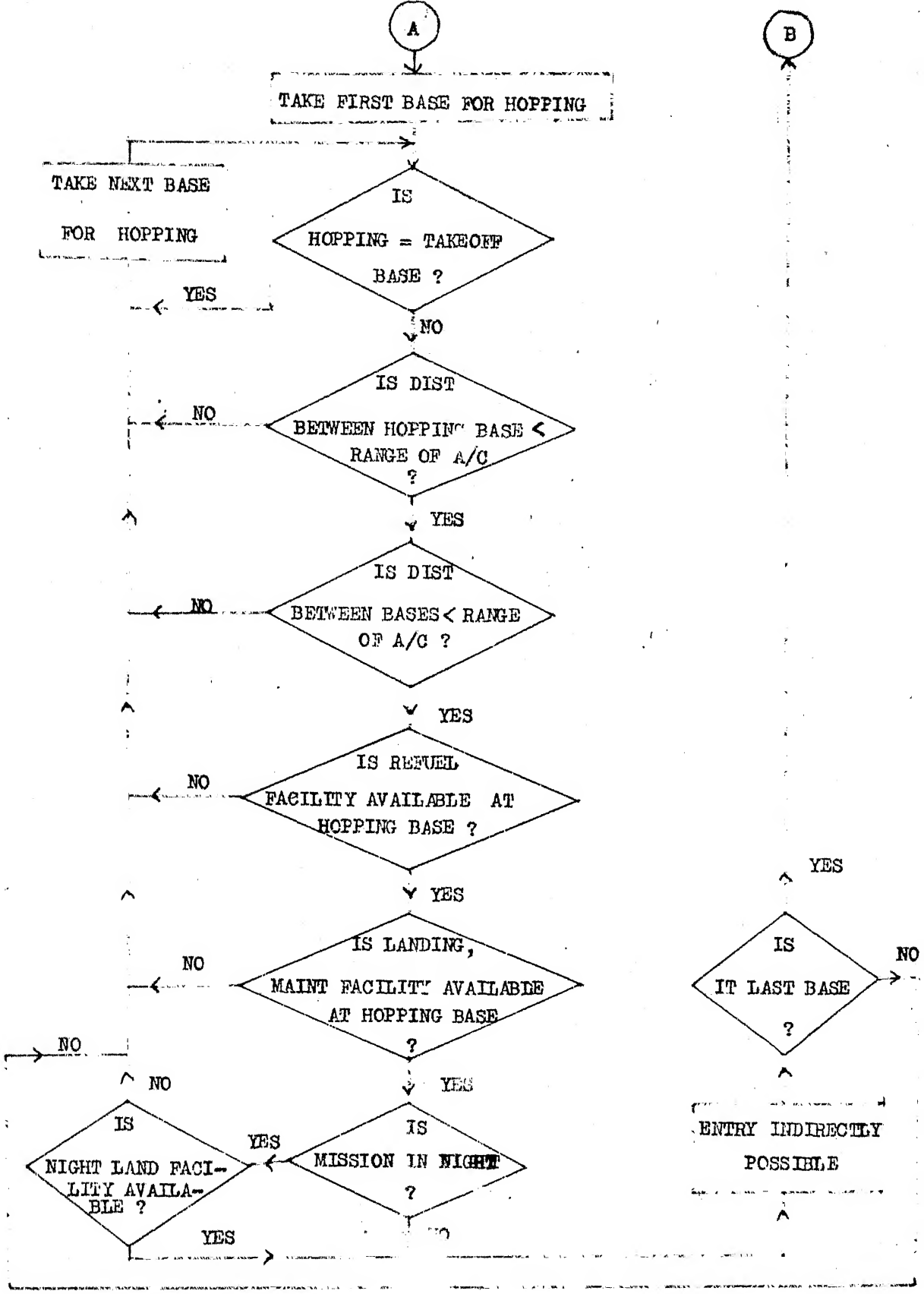


Fig. 4.4: CHECK T/INDIRECT MISSION POSSIBILITY

CHAPTER 5

TARGET-WEAPON RELATION

Weapons and targets are two entities which are of most concern to military decision makers. The term weapon system is new but ideas behind it have been recognised and used for centuries. In recent years weapons of war have become extremely complex hence an intelligent way of its use has become necessary.

Weapon effectiveness, by which we mean a numerical quantity that serves as an indicator of the degree to which the weapon achieves this objective depends not only on the efficient integration of various components of that weapon itself but also on its characteristics in relation to the environment in which it has to operate.

5.1 WEAPON SELECTION:

There are a number of weapons of different ranges and effectiveness which an aircraft can carry for a selected mission. The main purpose of this chapter is to determine the best weapon for a particular purpose.

The aircrafts for tactical use are either fighter or bombers, which carry guns of different capabilities and caliber with an alternative armament of unguided rockets. Guns are not much effective as speeds and altitudes of bombers

and bomber have increased. Now a days the trend is to employ guided or unguided missiles which are better than guns. But with the use of missiles the weapon system has become complicated, because its use involves guidance, range of guidance system and performance characteristics.

While selecting the weapon the consideration is given to:

(a) Type of weapon
(b) Weapon performance characteristics
(c) Weapon development
(d) Weapon employment tactics
(e) Weapon employment strategy
(f) War doctrine

In the present work use has been made of measure of effectiveness of weapon system on enemy forces deployment. All data are ficticious. Various parameters have been taken into consideration, such as;

(a) Attrition inflicted on the enemy
(b) Attrition inflicted by own aircrafts
(c) Probability of hit and chances of target survival.
(d) Comparative value of target
(e) Priority of hit and its repurcussions
(f) Effectiveness of the system.

In this analysis before selecting the type of weapon and aircraft there are a few important factors affecting the ammunition placement on the target, are also considered namely;

(a) Enemy position; i.e., the intensity and effectiveness of enemy forces, anti-aircraft measure adopted by enemy.

(b) Flight procedure; i.e. what should be the selection of aircraft and its speed etc.

(c) Weapon selection.

(d) Battle damage and losses.

(e) Training procedure; categories of pilots, their kill standard and performance.

5.2 TARGET-WEAPON MODEL:

Keeping in mind, points mentioned above, the following mathematical model of target weapon allocation [LEMUS'63] has been used in the present work.

The threat is composed of groups of attacking units (say aircraft weapon system) to an assemblage of targets each of which has a certain worth to the attacker and for each of which the probability of hitting is known. Attacker must assign all of his weapons before the effect of any individual shot is assessed. Targets are assumed to remain fixed in

one position and dispersed so that the attacker can't possibly knock more than one of them with a single shot.

Let us assume

1. N = Number of targets
2. V_i = Value of each of N targets to the attacker; $V_i \geq 0$
3. K = Different types of weapon for attacking
4. M_j = Number of weapons of each type
5. p_{ij} = Probability of distroying the ith target with weapon of jth type.
6. $Q_{ij} = 1-p_{ij}$ = probability of target i surviving on attack by weapon of type j.
7. X_{ij} = Number of weapons of jth type assigned to the ith target .
8. All targets are within the range of all weapons under consideration.
9. L_j = Weighting factor that converts a weapon of one type into an equivelent number.

$$S_i = \sum_{j=1}^{j=K} L_j X_{ij}$$

Now the problem is;

Maximising the expected value E of the sum of the targets destroyed , subjected to the restriction that the sum of the weapons of jth type must be equal to the total number of weapons of its kind that are available.

That is;

To find the set of X_{ij} that maximises

$$E = \sum_{i=1}^{i=N} V_i \left[1 - \prod_{j=1}^{J=K} (1 - p_{ij})^{X_{ij}} \right] \qquad (1)$$

Subjected to

$$\sum_{i=1}^{i=N} X_{ij} = M_j \text{ for } j=1,2,\ldots K \qquad (2)$$

and

$$X_{ij} \geqslant 0$$

$$1 \geqslant p_{ij} \geqslant 0$$

The above problem of maximising eqn. (1) subjected to eqn. (2) reduces to finding the maximum of

$$E = \sum_{i=1}^{i=N} V_i \left(1 - Q_{i1}^{S_i}\right) \qquad (3)$$

Subjected to

$$\sum_{i=1}^{i=N} S_i = \sum_{j=1}^{j=K} M_j = M \qquad (4)$$

The above formula is solved by iterative method explained by [DEN G.G.].

The maximisation of eqn.(3) by the Lagrange Multiplier Method consists of obtaining S_i^* , the value that maximises the function $E(S_1, S_2 \ldots S_n)$, subjected to equality constraints of eqn.(4) (LEMUS'63), thus;

$$S_i^* = \frac{[\log_e V_i - \log_e \lambda + \log_e (\log_e (\frac{1}{Q_{i1}}))]}{\log_e (\frac{1}{Q_{i1}})}$$

$$\log_e \lambda = \frac{B-M}{C}$$

where

$$B = \sum_{i=1}^{N} [\frac{\log_e (V_i \cdot \log_e (\frac{1}{Q_{i1}}))}{\log_e (\frac{1}{Q_{i1}})}]$$

$$C = \sum_{i=1}^{N} [\frac{1}{\log_e (\frac{1}{Q_{i1}})}]$$

Now if t targets out of N yield $S_i^* < 0$ then either they cannot be hit or they are of too little value to us. In such case, the method is used for N-t targets. Once the value of each S_i^* is known the number of weapon of jth type assigned to the ith target is given as;

$$X_{ij} = \frac{M_j S_i^*}{M}$$

The above value of X_{ij} constitutes solution to the problem of maximising.

5.3 USE OF SECTION 5.2 IN PRESENT WORK:

In the program developed for the purpose, each base is assumed to have a certain amount of weapons of various types. But the commander may or may not like to allot the entire amount of weapons for one mission only. It is at his

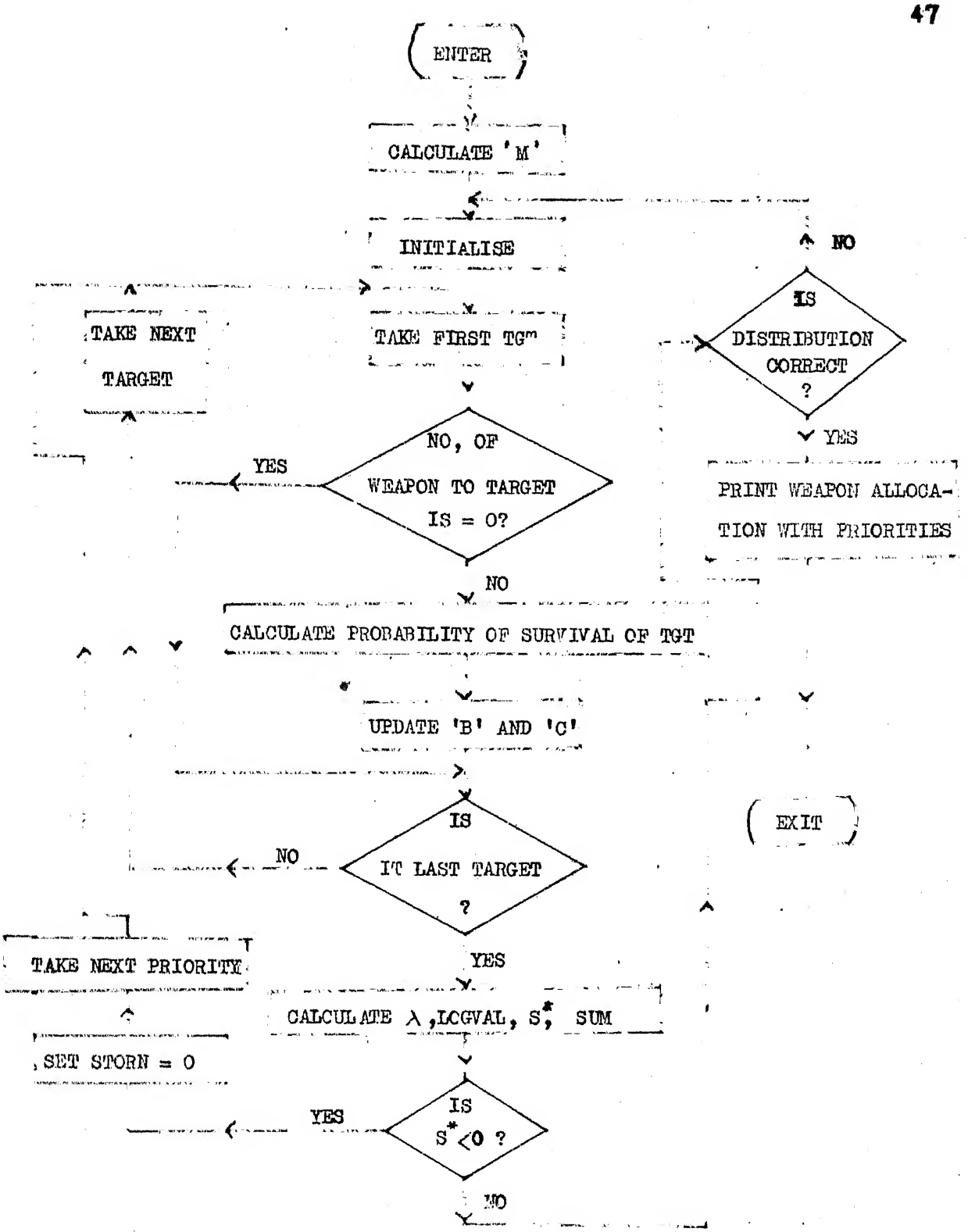


Figure 5.1 : WEAPON-TARGET ALLOCATION

discretion how much he wishes to use. Interactive programming technique has been used to allot a specific amount of weapon which a commander would like to use. At this stage the program executes the target weapon allocation program and final allocation of weapons with number and type for specific target with priority, is available for decision. The program calculates overall weightage 'M'. Taking the first target, calculation is made for probability of survival (q_{ij}) with jth type of weapon; then B and C factors are calculated. Factors $\log_e \lambda$, $\log_e(\frac{1}{q_{i1}})$, S_i^* and total sum are calculated after this. If the value of S_i^* is less than zero; this value is assumed to be zero and further allocation of weapon is carried out till such time all values of $S_i^* \geqslant 0$ if the column sum of S_i^* is equal to M. Then calculation is carried out for number and type of weapon for final allocation.

Once the allocation of weapon has been carried out, check; whether this type of weapon is sufficient to cause the damage required. If it is not so, then recycling of allotted weapon is carried out to maximise the use of weapon.

CHAPTER 6

DECISION FOR MISSION BY COMMANDER

6.1 STUDY OF OVERALL MISSION POSSIBILITIES:

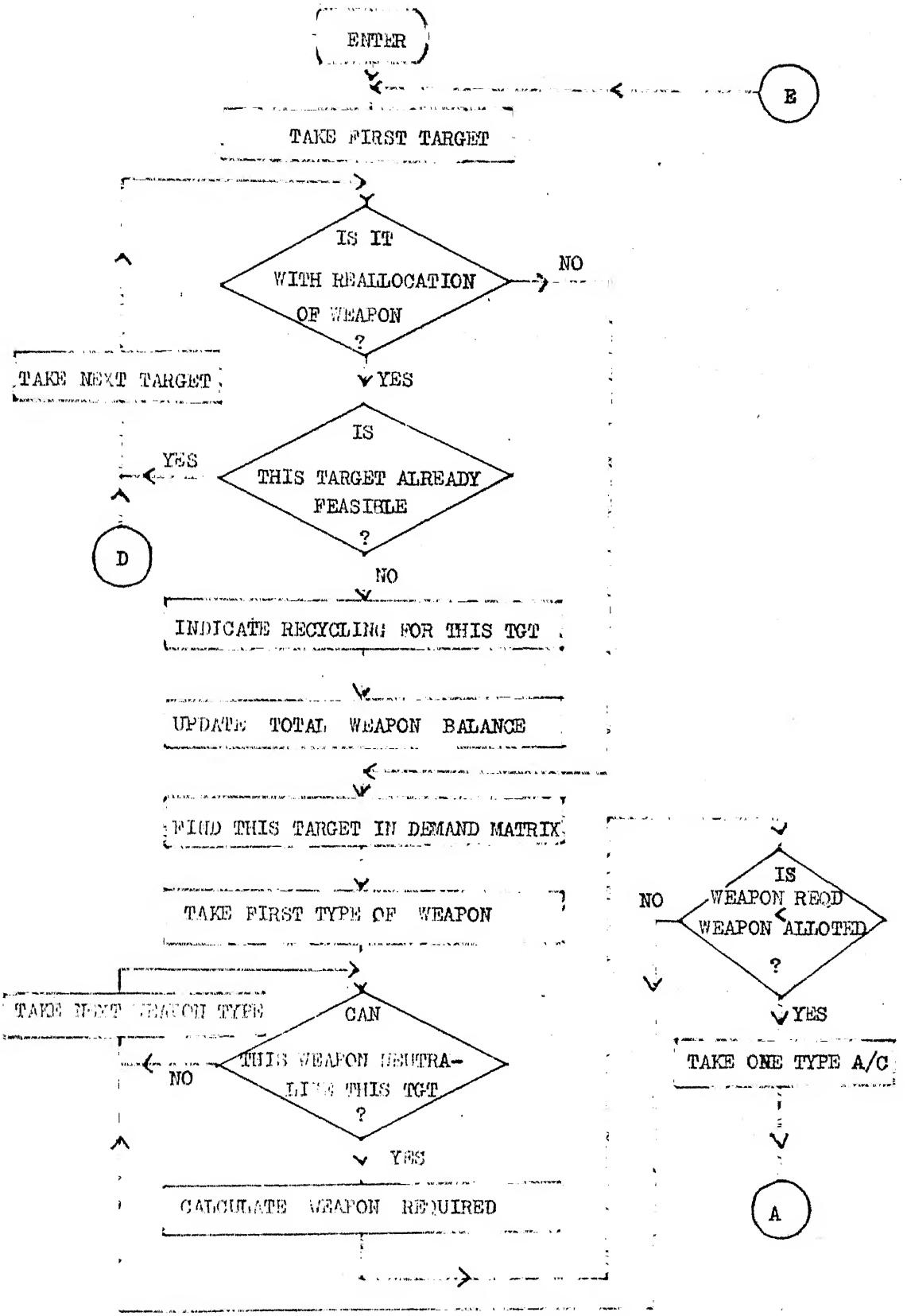
After having considered base, aircraft, and target weapon relations, the program calculates the overall mission possibilities.

The program starts by taking the target of priority one. The requirement of weapon and its type is checked from the weapon allocation matrix. In case the weapon allotted for this target is more than required, then its position in demand matrix is located, whereas if mission falls short of ammunition then recycling of ammunition is carried out and accordingly the weapon matrix is updated.

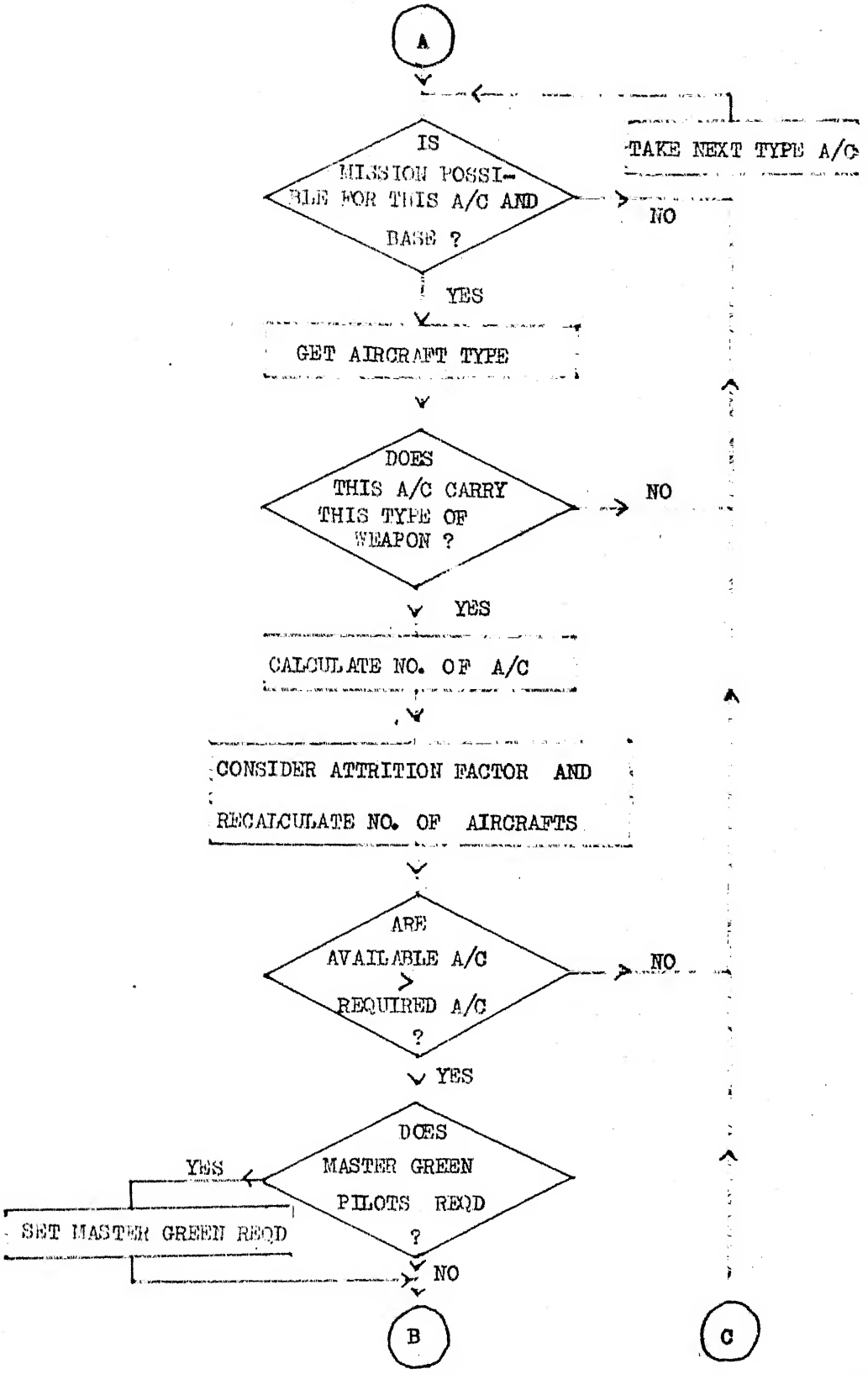
The check is carried out to find feasibility of destruction with different kind of weapon considering the type one weapon first and so on. In case the destruction of this target having priority one is possible, effort is made to find the actual amount of weapons required.

6.2 CONSIDERATION OF AIRCRAFTS:

The next task is to find the suitable type and number of aircrafts from various bases. In aircraft matrix from Appendix 'B' it is shown that each aircraft type has certain


ENTER
E
TAKE FIRST TARGET
IS IT WITH REALLOCATION OF WEAPON ?
NO
YES
TAKE NEXT TARGET
IS THIS TARGET ALREADY FEASIBLE ?
YES
D
NO
INDICATE RECYCLING FOR THIS TGT
UPDATE TOTAL WEAPON BALANCE
FIND THIS TARGET IN DEMAND MATRIX
TAKE FIRST TYPE OF WEAPON
IS WEAPON REQD WEAPON ALLOTED ?
NO
YES
TAKE ONE TYPE A/C
A
TAKE NEXT WEAPON TYPE
CAN THIS WEAPON NEUTRALISE THIS TGT ?
NO
YES
CALCULATE WEAPON REQUIRED

contd...


A
IS MISSION POSSIBLE FOR THIS A/C AND BASE ?
NO
TAKE NEXT TYPE A/C
YES
GET AIRCRAFT TYPE
DOES THIS A/C CARRY THIS TYPE OF WEAPON ?
NO
YES
CALCULATE NO. OF A/C
CONSIDER ATTRITION FACTOR AND RECALCULATE NO. OF AIRCRAFTS
ARE AVAILABLE A/C > REQUIRED A/C ?
NO
YES
DOES MASTER GREEN PILOTS REQD ?
YES
SET MASTER GREEN REQD
NO
B
C

contd...

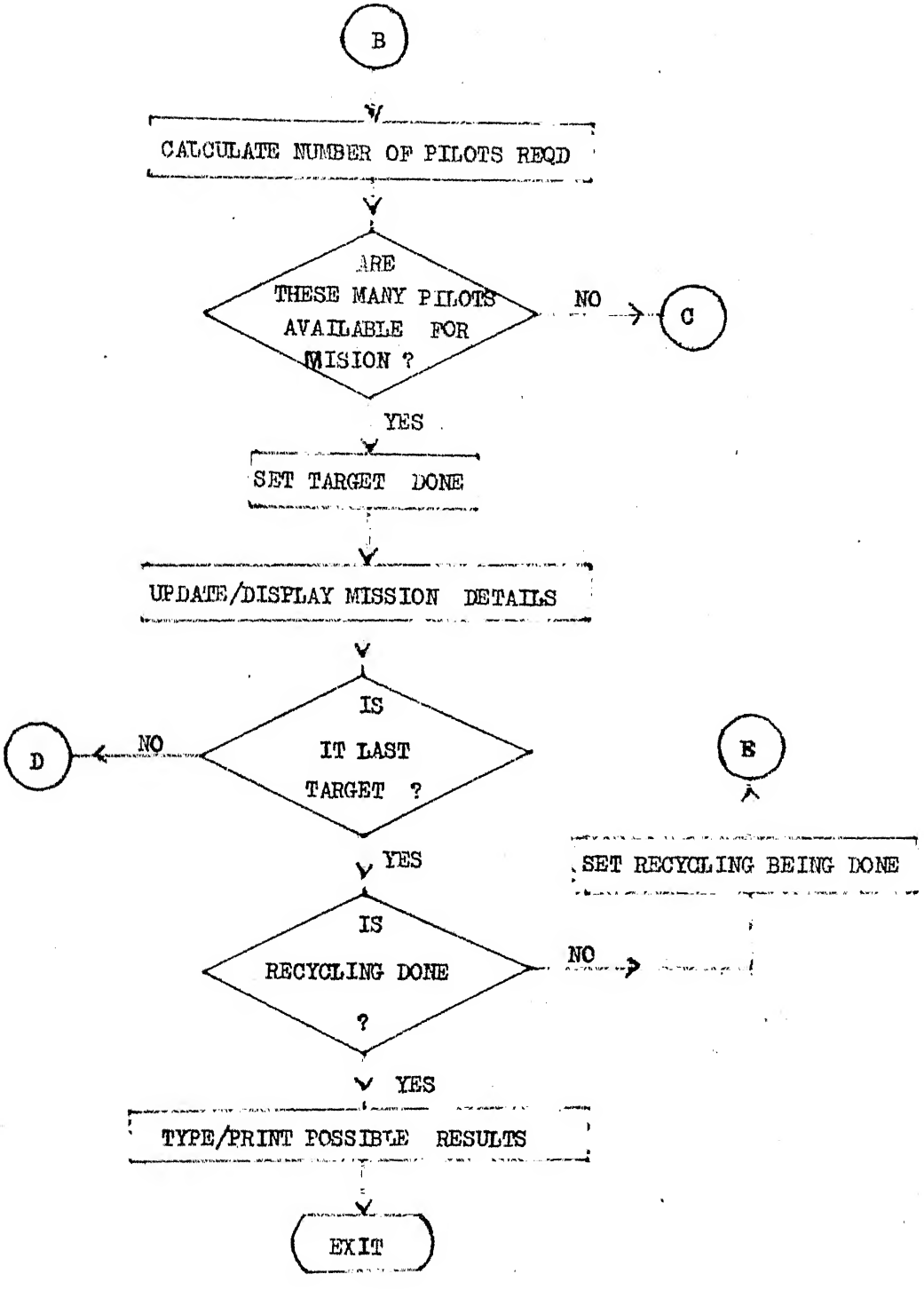


Figure 6.1: MISSION FEASIBILITY

capability to carry different types of weapons. Thus on this basis the number and types of aircrafts are calculated. At this stage it is felt that if the above number of selected aircrafts are finally sent for mission, they may meet casualties due to enemy's air defence effort. Hence the factor of attrition has been taken into consideration. This factor of attrition varies depending upon the type of target we want to hit, because the security arrangement provided by enemy for it will be of different degree. After taking the attrition factor into consideration the number of aircrafts are calculated.

The next step is to check whether this number of aircrafts are actually available for close air support operation at the various bases. This check is made from base matrix and aircraft matrix and finally the feasibility of number of aircrafts is carried out.

Once the number and type of aircrafts are selected, check is made for pilot and crew requirement. This check is made from pilot and crew requirement matrix. In case 'MAIN PILOTS' are less, then the effort is made to check some pilots from 'STANDBY PILOTS' in order to cater for mission.

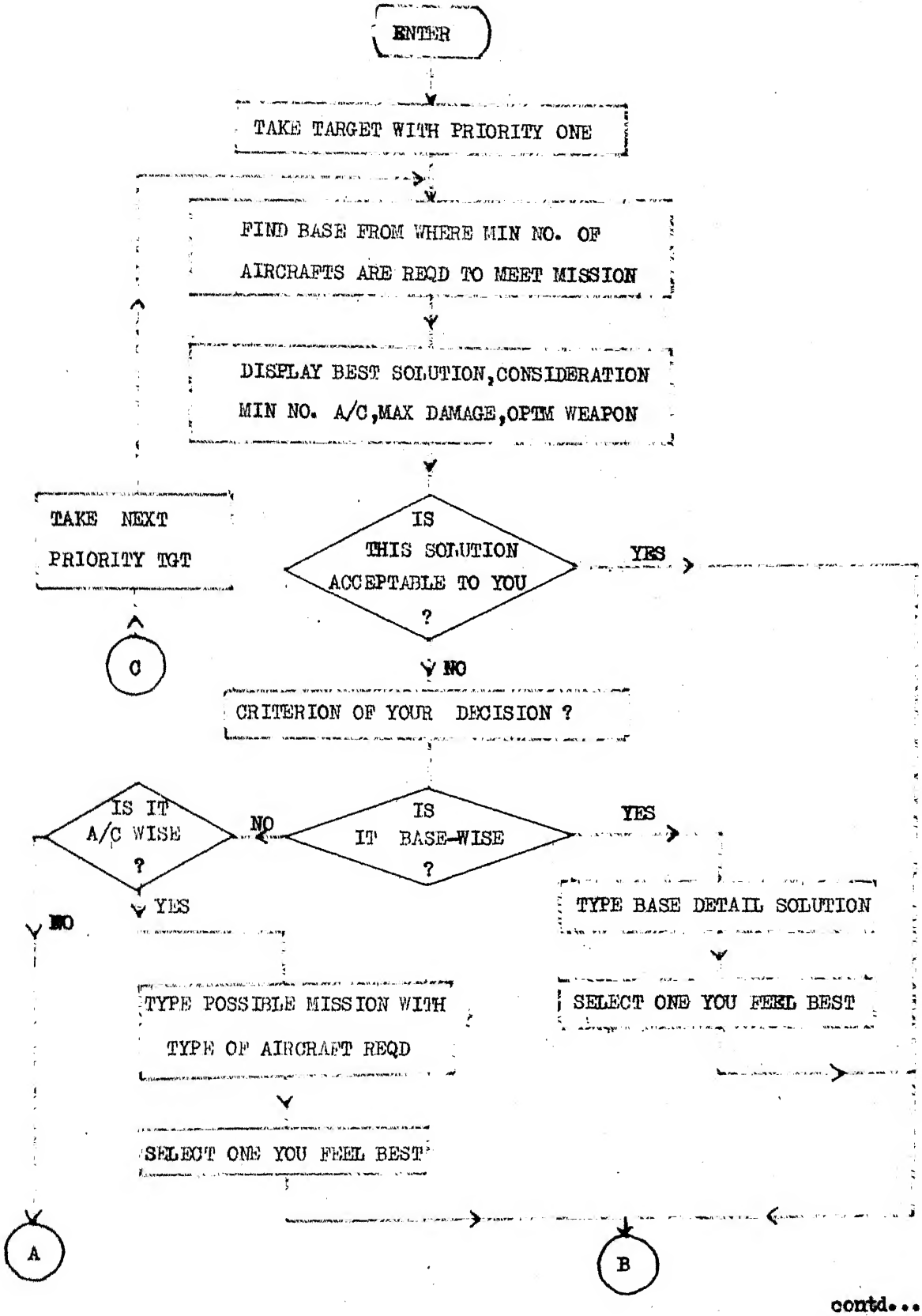
At this place check has been carried out for the requirement of 'MASTER GREEN' pilot, depending upon the weather and night flying conditions, since a normal pilot can not fly either in bad weather or night.

Once the above factors are co-related and exact possible mission requirements are met, the feasible missions are displayed on CRT for commander's decision, after checking for all type of target, type of ammunition and aircrafts from various bases,in a chronological order.

6.3 DECISION BY COMMANDER:

In this phase effort has been made to provide all possible help to commander in selecting one final solution for mission execution.

From the previous phase total mission possibilities are available to the commander, but the number of such feasible missions may be large. This might make it difficult for the commander to arrive at the right decision. Thus for helping the commander the criterion selected here is to display the decisions, target priority-wise starting of target of priority one. The best solution is found out for this after considering maximum damage, with minimum number of aircrafts and least amount of ammunition. Now commander is given an option to either select the best solution, thus calculated as his final decision or


ENTER
TAKE TARGET WITH PRIORITY ONE
FIND BASE FROM WHERE MIN NO. OF AIRCRAFTS ARE REQD TO MEET MISSION
DISPLAY BEST SOLUTION,CONSIDERATION MIN NO. A/C,MAX DAMAGE,OPTM WEAPON
TAKE NEXT PRIORITY TGT
IS THIS SOLUTION ACCEPTABLE TO YOU ?
YES
C
NO
CRITERION OF YOUR DECISION ?
IS IT A/C WISE ?
NO
IS IT BASE-WISE ?
YES
YES
NO
TYPE BASE DETAIL SOLUTION
SELECT ONE YOU FEEL BEST
TYPE POSSIBLE MISSION WITH TYPE OF AIRCRAFT REQD
SELECT ONE YOU FEEL BEST
A
B

contd...

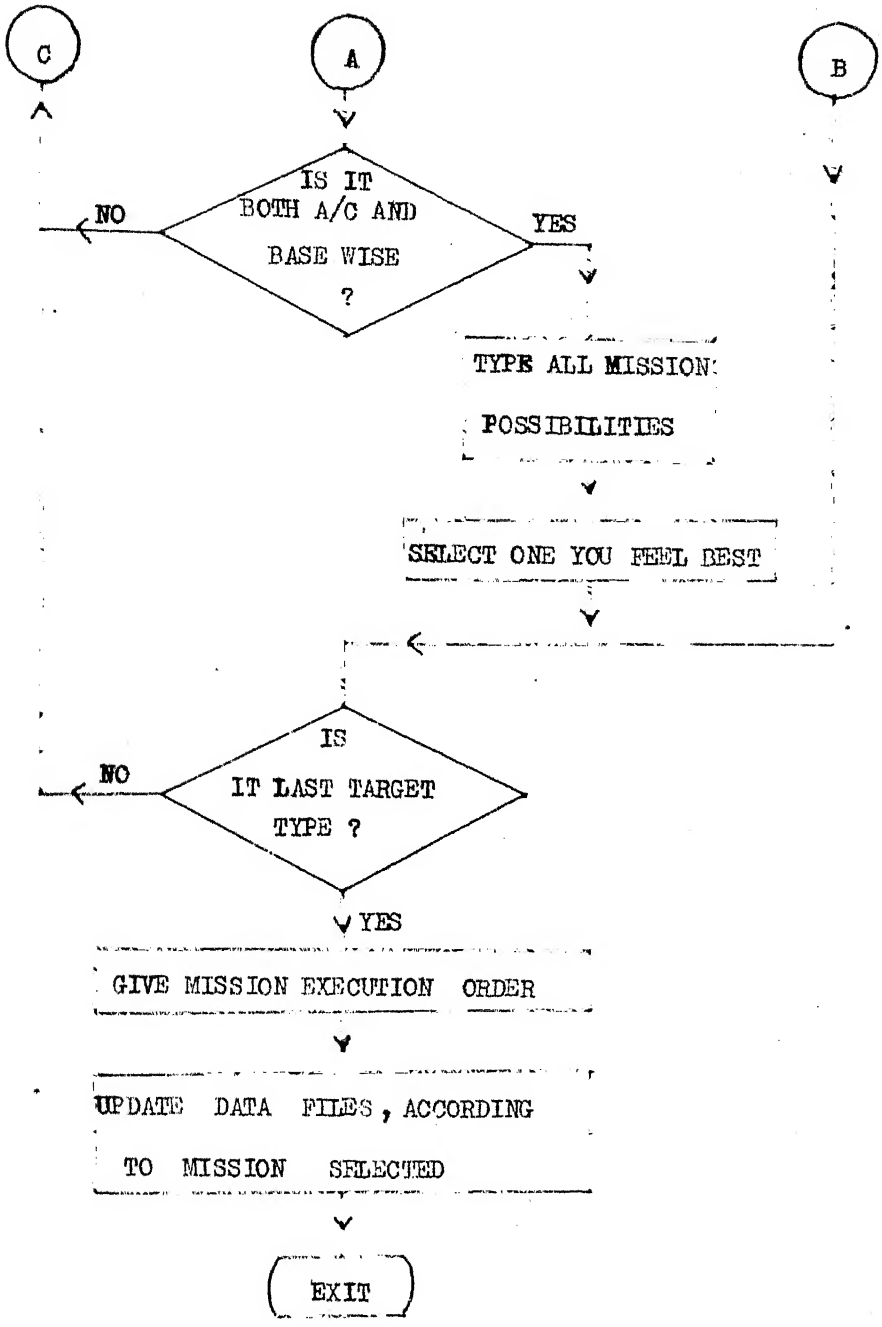


Figure 6.2: COMMANDER'S DECISION

not select this decision. In case he accepts it, the next priority - two target is taken for consideration. Otherwise for the priority one target he is asked the criterion on which he would like to take decision. This factor could be particular base, particular type of aircraft or type of ammunition. Provision is made to see the mission possibilities base-wise and aircraft-wise, and then commander is asked to select the one which he feels best. Once he picks up a solution it is assumed to be the final solution for that target type. This process of decision making is repeated for all types of target till the last priority target.

6.4 MISSION EXECUTION ORDER AND UPDATING FILES:

Once the commander has selected the mission the decision is conveyed to the bases involved, through Radio Communication net. In the mean time the operation officer assisting the commander updates the files assuming that the mission is being undertaken. The computer is now ready to accept next air support request for decision.

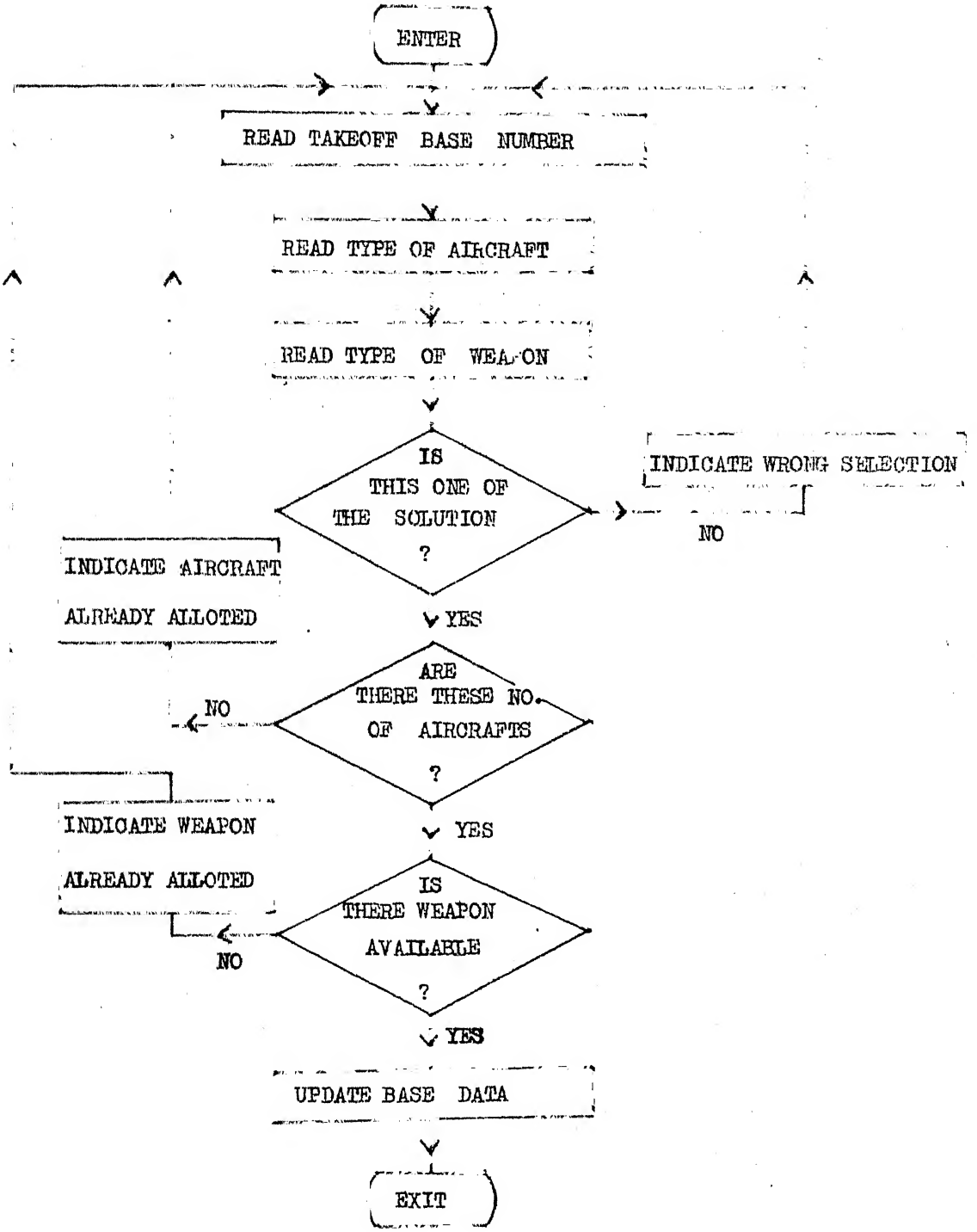


Figure 6.3: SELECTION/UPDATING SUBROUTINE

CHAPTER 7

RESULTS, CONCLUSION AND SUGGESTIONS

7.1 RESULTS:

The program for processing close air support demand has been developed in FORTRAN-10 language and has been run on DEC system 1090 computer. Ficticious data, like that of base, aircraft, target, weather and pilots status has been created for testing the program. (Appendix 'B').

The software was designed in steps and uses twelve subroutines. A listing of the program is given as Appendix '

The program has been run for five types of air requests to test for maximum number of targets, minimum time available for strike, maximum and minimum range, and for different weather conditions. Satisfactory results have been obtained and are given as Appendix 'C'. In processing these air requests, computer takes one demand at a time through one terminal and displays the feasibility report of mission for commander's consideration.

7.2 CONCLUSION:

In this thesis an interactive programming model to arrive at a fairly good decision by an Air Force Commander, in a short time for Close Air Support operation, has been developed and tested.

A study has been carried out of military decisions in the context of close air operations in Chapter 1, emphasis has been laid on the various ideas entering into commander's decision making criterion and commander's role to arrive at a decision, is discussed in Chapter 2. The use of computer as an aid to decision maker is discussed in Chapter 3, with a brief reference to the limitation and advantage of computer for present use.

Chapter 4 to 6 deal with the explanation of software developed. In Chapter 5 a study was carried out regarding target and weapon relation. The commander has been given the option to select any decision which he feels is better.

7.3 SUGGESTIONS:

In the present system, the messages for close air support are transmitted in voice form or teletype and hand copies for further action are prepared. This may result in time delay and leakage of information. Data automation could likely reduce these delays and may provide greater accuracy in sorting, comparing, correlating certain data prior to basic decision making. This data automation will need development of digital message entry device for use by forward air controllers and Tactical Air Control system. Console service provided at FAC, TAC, and bases can directly communicate with central computer.

In the present programme, the aircrafts under maintenance in hangers have not been considered for use. With proper planning and scheduling this can be done.

The present programme considers the aircrafts which are available only for close Air Support operation and consideration could not be given for their optimal use for other kind of operations like air defence and interdiction role. A program can be developed after considering all kinds of aircrafts and optimal distribution of such aircrafts for other roles.

Furthermore, performance characteristics of aircrafts like climb rate, altitude consideration which effects range and speed can also be considered.

A thorough programmed study of electronic counter measure and electronic counter-counter measure facilities and its effect can be incorporated in the present program.

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APPENDIX A

CLOSE AIR SUPPORT REQUEST NO :_____

TARGET COORDINATE :_____EAST , _____NORTH

* WEATHER OVER TARGET :_____

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED :_____

* PRESENT TIME :_____

TARGET TYPE :_____

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY :_____

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT :_____

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

APPENDIX B

APPENDIX C

CLOSE AIR SUPPORT REQUEST NO : 1

TARGET COORDINATE : 665 EAST , 955 NORTH

* WEATHER OVER TARGET : 9

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED : 220430

* PRESENT TIME : 211800

TARGET TYPE : 1,2,3,4,6,8,8,6,5,4

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY : 2,3,4,5,7,9,7,5,4,3

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT : 4

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

```
 GIVE APPROX SIX FIGURE GRID REF OF TGT
 665955
 GIVE TYPE OF WEATHER NO. FROM 1 TO 10
  9
 GIVE SIX FIGURE TIME OF STRIKE REQUIRED
 220430
 GIVE PRESENT TIME IN SIX FIGURES
 211800
                  DEMAND MATRIX
     TGT         VGT         MGT         TTV         POH
   1.000       1.000       2.000       2.000       8.000
   2.000       1.000       3.000       3.000       5.000
   3.000       0.500       4.000       2.000       9.000
   4.000       0.500       5.000       3.000       6.000
   6.000       0.500       7.000       4.000       4.000
   8.000       1.000       9.000       9.000       2.000
   8.000       1.000       7.000       7.000       3.000
   6.000       0.500       5.000       3.000       7.000
   5.000       2.500       4.000      10.000       1.000
   4.000       0.500       3.000       2.000      10.000

            DIST OF TGT FROM BASES
       838         607         554         212         344
 STRIKE POSSIBLE FROM THE FOLLOWING BASES
BASE-> 3

BASE-> 4

 AMMUNATION AVAILABLE AT BASE 3
 TYPE - 1,  QTY -  50
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 2,  QTY -  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   10
 TYPE - 3,  QTY -  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 4,  QTY - 300
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  100
 TYPE - 5,  QTY -2750
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 2000

       WEAPON OF EACH KIND TO TARGET 3
     AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
        2        2        0        5        0
        2        1        0        9        0
        1        0        1        4       94
        1        0        2        6      152
        1        1        3        6      154
        1        0        3        6      154
        1        0        3        6      154
        7        2        5       19      431
        7        2        6       19      431
        7        2        5       19      430

 COSIDERING RECYCLING OF AMMUNATION FOR TGT 1
 COSIDERING RECYCLING OF AMMUNATION FOR TGT 2

MISSION POSSIBLE FROM BASE-> 3   FOR TARGET TYPE - 8   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 36   TYPE - 5   AMMUNATION
```

```
NOTE -> 4Master Green Pilots  required for this mission
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 3

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 8    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  7    TYPE - 1    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 8    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  7    TYPE - 4    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 8    WITH - 1
AIRCRAFT TYPE - 5    CARRYING - 28    TYPE - 5    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 4
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 5

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 2    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  3    TYPE - 1    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 2    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  3    TYPE - 4    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 2    WITH - 1
AIRCRAFT TYPE - 5    CARRYING - 30    TYPE - 5    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 6

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 4    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  5    TYPE - 1    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 4    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  5    TYPE - 4    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 4    WITH - 1
AIRCRAFT TYPE - 5    CARRYING - 25    TYPE - 5    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 7
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 8

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 1    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  4    TYPE - 1    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 1    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  2    TYPE - 4    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 1    WITH - 1
AIRCRAFT TYPE - 5    CARRYING - 40    TYPE - 5    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
  COSIDERING RECYCLING OF AMMUNATION FOR TGT 9

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 3    WITH - 1
AIRCRAFT TYPE - 5    CARRYING -  4    TYPE - 4    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE - 3    WITH - 1
AIRCRAFT TYPE - 5    CARRYING - 40    TYPE - 5    AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
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 CONSIDERING RECYCLING OF AMMUNATION FOR TGT10

MISSION POSSIBLE FROM BASE-> 3   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  3   TYPE - 1   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 3   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
 AMMUNATION AVAILABLE AT BASE 4
 TYPE - 1,  QTY -  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  10
 TYPE - 2,  QTY -  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  50
 TYPE - 3,  QTY -  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  40
 TYPE - 4,  QTY - 190
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  190
 YOUR RESERVE AMMUNATION REQUIRED
LIKE TO USE RESERVE AMN -TYPE YES/NO

TYPE - 5,  QTY -3800
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 3000

      WEAPON OF EACH KIND TO TARGET 4
    AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
       1        8        0       21        0
       2        6        0       19        0
       0        1        2        7      103
       1        2        3        9      165
       0        2        3       10      165
       0        2        3       10      165
       0        2        2        9      165
       2        9        9       35      746
       2        9        9       35      746
       2        9        9       35      745

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 2   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 2   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
```

```
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 2   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 2   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 4   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 15   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4   FOR TARGET TYPE - 4   WITH - 1
AIRCRAFT TYPE - 4   CARRYING -  3   TYPE - 2   AMMUNATION
```

```
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE - 4    WITH - 1
AIRCRAFT TYPE - 4    CARRYING -  3    TYPE - 4    AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE - 4    WITH - 1
AIRCRAFT TYPE - 4    CARRYING - 15    TYPE - 5    AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission
 CONSIDERING TARGET TYPE - 5   PRIORITY - 1

BEST POSSIBLE SOLUTION IS --
  1   ACS OF TYPE - 4   FROM BASE - 4   WITH AMN OF TYPE - 2
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION REQD
 FOR BASE TYPE-1
FOR AC TYPE-2
FOR BOTH TYPE-3
 TYPE:

 3
      BASE TYP OF AC AMN TYP NO OF AC
        4         4         2         1
        4         4         4         1
 GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 4
 CONSIDERING TARGET TYPE - 8   PRIORITY - 2

BEST POSSIBLE SOLUTION IS --
  1   ACS OF TYPE - 5   FROM BASE - 3   WITH AMN OF TYPE - 5
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 5
 CONSIDERING TARGET TYPE - 8   PRIORITY - 3

BEST POSSIBLE SOLUTION IS --
  1   ACS OF TYPE - 5   FROM BASE - 3   WITH AMN OF TYPE - 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION REQD
 FOR BASE TYPE-1
FOR AC TYPE-2
FOR BOTH TYPE-3
 TYPE:
```

```
 1
 GIVE BASE NUMBER:

 3
      BASE TYP OF AC AMN TYP NO OF AC
         3          5          1          1
         3          5          4          1
         3          5          5          1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE BASE NUMBER:

 5
      BASE TYP OF AC AMN TYP NO OF AC

WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE BASE NUMBER:

 4
      BASE TYP OF AC AMN TYP NO OF AC
         4          4          4          1
         4          4          5          1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 5
 CONSIDERING TARGET TYPE = 6  PRIORITY = 4

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 4  FROM BASE = 4  WITH AMN OF TYPE = 4
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 2
 GIVE AIRCRAFT TYPE:

 5
      BASE TYP OF AC AMN TYP NO OF AC

WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE AIRCRAFT TYPE:

 4
      BASE TYP OF AC AMN TYP NO OF AC
         4          4          4          1
         4          4          5          1
 WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?
```

```
GIVE AIRCRAFT TYPE:

 3
     BASE TYP OF AC AMN TYP NO OF AC

WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE AIRCRAFT TYPE:

 1
     BASE TYP OF AC AMN TYP NO OF AC

WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 2  PRIORITY = 5

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 3
     BASE TYP OF AC AMN TYP NO OF AC
       3         5         1         1
       3         5         4         1
       3         5         5         1
       4         4         4         1
       4         4         5         1
 GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 5
 CONSIDERING TARGET TYPE = 4  PRIORITY = 6

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
```

```
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 1
 GIVE BASE NUMBER:

 4
      BASE TYP OF AC AMN TYP NO OF AC
        4         4         4         1
        4         4         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE BASE NUMBER:

 3
      BASE TYP OF AC AMN TYP NO OF AC
        3         5         1         1
        3         5         4         1
        3         5         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 6  PRIORITY = 7

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 4  FROM BASE = 4  WITH AMN OF TYPE = 4
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 4
 CONSIDERING TARGET TYPE = 1  PRIORITY = 8

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
```

```
FOR AC TYPE-2
FOR BOTH TYPE-3
 TYPE:

 1
 GIVE BASE NUMBER:

 4
      BASE TYP OF AC AMN TYP NO OF AC
        4         4         4         1
        4         4         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE BASE NUMBER:

 3
      BASE TYP OF AC AMN TYP NO OF AC
        3         5         1         1
        3         5         4         1
        3         5         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 6  PRIORITY = 7

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 4  FROM BASE = 4  WITH AMN OF TYPE = 4
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 4
 CONSIDERING TARGET TYPE = 1  PRIORITY = 8

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 5
```

```
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 3  PRIORITY = 9

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 4
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 3
      BASE TYP OF AC AMN TYP NO OF AC
         3         5         4         1
         3         5         5         1
         4         4         2         1
         4         4         4         1
         4         4         5         1
 GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 1
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 2
 CONSIDERING TARGET TYPE = 4  PRIORITY =10

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 3  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 3
      BASE TYP OF AC AMN TYP NO OF AC
         3         5         1         1
         3         5         4         1
         3         5         5         1
         4         4         2         1
         4         4         4         1
         4         4         5         1
 GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 5
BEST OF LUCK FOR MISSION SELECTED
```

CLOSE AIR SUPPORT REQUEST NO : 2

TARGET COORDINATE : 400 EAST , 700 NORTH

* WEATHER OVER TARGET : 1

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED : 220000

* PRESENT TIME : 212345

TARGET TYPE : 2,3,4

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY : 7,8,9

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT : 3

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

```
GIVE APPROX SIX FIGURE GRID REF OF TGT
400700
GIVE TYPE OF WEATHER NO. FROM 1 TO 10
 1
GIVE SIX FIGURE TIME OF STRIKE REQUIRED
220000
GIVE PRESENT TIME IN SIX FIGURES
212345
                    DEMAND MATRIX
     TOT         VOT         NOT         TTV         POH
 2.000       1.000       7.000       7.000       1.000
 3.000       0.500       8.000       4.000       3.000
 4.000       0.500       9.000       5.000       2.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
 0.000       0.000       0.000       0.000       0.000
              DIST OF TGT FROM BASES
      509         357         496         434         165
STRIKE POSSIBLE FROM THE FOLLOWING BASES

SORRY! MISSION NOT POSSIBLE
```

CLOSE AIR SUPPORT REQUEST NO : 3

TARGET COORDINATE : 400 EAST , 700 NORTH

* WEATHER OVER TARGET : 6

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED : 220430

* PRESENT TIME : 211800

TARGET TYPE : 2,3,9

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY : 7,8,4

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT : 1

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

```
GIVE APPROX SIX FIGURE GRID REF OF TGT
400700
GIVE TYPE OF WEATHER NO. FROM 1 TO 10
 6
GIVE SIX FIGURE TIME OF STRIKE REQUIRED
220430
GIVE PRESENT TIME IN SIX FIGURES
211800
                  DEMAND MATRIX
     TOT         VOT         NOT         TTV         POH
   2.000       1.000       7.000       7.000       1.000
   3.000       0.500       8.000       4.000       3.000
   9.000       1.500       4.000       6.000       2.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000
   0.000       0.000       0.000       0.000       0.000

            DIST OF TGT FROM BASES
       509         367         496         434         165
 STRIKE POSSIBLE FROM THE FOLLOWING BASES
BASE-> 1

BASE-> 2

BASE-> 3

BASE-> 4

 AMMUNATION AVAILABLE AT BASE 1
 TYPE - 1,  QTY - 100
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 2,  QTY -  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   20
 TYPE - 3,  QTY -  70
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 4,  QTY - 200
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  100
 TYPE - 5,  QTY -4000
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 2000

       WEAPON OF EACH KIND TO TARGET 1
     AMN-1     AMN-2     AMN-3     AMN-4     AMN-5
        9         3         9        14       620
        5        14         6        70       413
       15         3        15        16       967
        0         0         0         0         0
        0         0         0         0         0
        0         0         0         0         0
        0         0         0         0         0
        0         0         0         0         0
        0         0         0         0         0
        0         0         0         0         0

COSIDERING RECYCLING OF AMMUNATION FOR TGT 1
```

```
MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  7   TYPE - 1   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  7   TYPE - 4   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 70   TYPE - 5   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
 CONSIDERING RECYCLING OF AMMUNATION FOR TGT 2

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 9   WITH - 2
AIRCRAFT TYPE - 5   CARRYING -400   TYPE - 5   AMMUNATION
NOTE -> 9Master Green Pilots  required for this mission
 CONSIDERING RECYCLING OF AMMUNATION FOR TGT 3

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 2
AIRCRAFT TYPE - 5   CARRYING -  8   TYPE - 4   AMMUNATION
NOTE -> 8Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 80   TYPE - 5   AMMUNATION
NOTE -> 4Master Green Pilots  required for this mission
 AMMUNATION AVAILABLE AT BASE 2
 TYPE - 1,  QTY - 130
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  20
 TYPE - 2,  QTY - 120
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  30
 TYPE - 3,  QTY -  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  10
 TYPE - 4,  QTY - 180
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  80
 TYPE - 5,  QTY -5000
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 1000

      WEAPON OF EACH KIND TO TARGET 2
    AMN-1   AMN-2   AMN-3   AMN-4   AMN-5
      5       4       3      11     308
      1      22       2      55     209
     10       4       5      14     483
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0

MISSION POSSIBLE FROM BASE-> 2   FOR TARGET TYPE - 3   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 80   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE-> 2   FOR TARGET TYPE - 3   WITH - 1
AIRCRAFT TYPE - 4   CARRYING - 80   TYPE - 5   AMMUNATION
NOTE -> 3Master Green Pilots  required for this mission
```

```
MISSION POSSIBLE FROM BASE=> 2   FOR TARGET TYPE = 3   WITH = 1
AIRCRAFT TYPE = 4   CARRYING = 80   TYPE = 5   AMMUNATION
NOTE => 3Master Green Pilots  required for this mission
 AMMUNATION AVAILABLE AT BASE 3
 TYPE = 1,   QTY =  50
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   20
 TYPE = 2,   QTY =  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   10
 TYPE = 3,   QTY =  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE = 4,   QTY = 300
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  100
 TYPE = 5,   QTY =2750
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 1000

         WEAPON OF EACH KIND TO TARGET 3
      AMN=1    AMN=2    AMN=3    AMN=4    AMN=5
         6        1        9       15      308
         4        7        6       68      209
        10        2       15       17      483
         0        0        0        0        0
         0        0        0        0        0
         0        0        0        0        0
         0        0        0        0        0
         0        0        0        0        0
         0        0        0        0        0
         0        0        0        0        0

MISSION POSSIBLE FROM BASE=> 3   FOR TARGET TYPE = 3   WITH = 1
AIRCRAFT TYPE = 4   CARRYING = 80   TYPE = 5   AMMUNATION
NOTE => 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE=> 3   FOR TARGET TYPE = 3   WITH = 1
AIRCRAFT TYPE = 4   CARRYING = 80   TYPE = 5   AMMUNATION
NOTE => 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE=> 3   FOR TARGET TYPE = 3   WITH = 1
AIRCRAFT TYPE = 4   CARRYING = 80   TYPE = 5   AMMUNATION
NOTE => 3Master Green Pilots  required for this mission
 AMMUNATION AVAILABLE AT BASE 4
 TYPE = 1,   QTY =  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   10
 TYPE = 2,   QTY =  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE = 3,   QTY =  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   40
 TYPE = 4,   QTY = 190
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   80
 TYPE = 5,   QTY =3800
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 1000
```

```
  WEAPON OF EACH KIND TO TARGET 4
AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
   3        4       12       11      309
   2       22        9       55      208
   5        4       19       14      483
   0        0        0        0        0
   0        0        0        0        0
   0        0        0        0        0
   0        0        0        0        0
   0        0        0        0        0
   0        0        0        0        0
   0        0        0        0        0

 MISSION POSSIBLE FROM BASE=> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION
NOTE => 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE=> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION
NOTE => 3Master Green Pilots  required for this mission

MISSION POSSIBLE FROM BASE=> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION
NOTE => 3Master Green Pilots  required for this mission
 CONSIDERING TARGET TYPE = 2  PRIORITY = 1

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 1  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 1
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 9  PRIORITY = 2

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 4  FROM BASE = 2  WITH AMN OF TYPE = 5
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 3
     BASE TYP OF AC AMN TYP NO OF AC
       1        5        5        2
       2        4        5        1
       3        4        5        1
       4        4        5        1
 GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 4
 TYPE OF AIRCRAFT

 4
```

```
 TYPE OF AMMUNATION

 5
 CONSIDERING TARGET TYPE = 3  PRIORITY = 3

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 1  WITH AMN OF TYPE = 5
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE-1
FOR AC TYPE-2
FOR BOTH TYPE-3
 TYPE:

 2
 GIVE AIRCRAFT TYPE:

 4
     BASE TYP OF AC AMN TYP NO OF AC
       2          4          5          1
       3          4          5          1
       4          4          5          1
 WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE AIRCRAFT TYPE:

 3
     BASE TYP OF AC AMN TYP NO OF AC
WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE AIRCRAFT TYPE:

 5
     BASE TYP OF AC AMN TYP NO OF AC
       1          5          4          2
       1          5          5          1
 WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 1
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 4

BEST OF LUCK FOR MISSION SELECTED
```

CLOSE AIR SUPPORT REQUEST NO : 4

TARGET COORDINATE : 400 EAST , 700 NORTH

* WEATHER OVER TARGET : 1

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED : 220430

* PRESENT TIME : 211800

TARGET TYPE : 2,3,9

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY : 7,8,4

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT : 1

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

```
GIVE APPROX SIX FIGURE GRID REF OF TGT
400700
GIVE TYPE OF WEATHER NO. FROM 1 TO 10
 1
GIVE SIX FIGURE TIME OF STRIKE REQUIRED
220430
GIVE PRESENT TIME IN SIX FIGURES
211800
          DEMAND MATRIX
     TOT        VOT        NOT        TTV        POH
   2.000      1.000      7.000      7.000      1.000
   3.000      0.500      8.000      4.000      3.000
   9.000      1.500      4.000      6.000      2.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000
   0.000      0.000      0.000      0.000      0.000

  DIST OF TGT FROM BASES
      509        367        496        434        165
 STRIKE POSSIBLE FROM THE FOLLOWING BASES
BASE-> 1

BASE-> 2

BASE-> 3

BASE-> 4

BASE-> 5

 AMMUNATION AVAILABLE AT BASE 1
 TYPE - 1,  QTY - 100
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 2,  QTY -  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   20
 TYPE - 3,  QTY -  70
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE - 4,  QTY - 200
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  100
 TYPE - 5,  QTY -4000
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 2000

      WEAPON OF EACH KIND TO TARGET 1
    AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
        9        3        9       14      620
        6       14        6       70      413
       15        3       15       15      967
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
```

```
CONSIDERING RECYCLING OF AMMUNATION FOR TGT 1

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  7   TYPE - 1   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING -  7   TYPE - 4   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 2   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 70   TYPE - 5   AMMUNATION
 CONSIDERING RECYCLING OF AMMUNATION FOR TGT 2

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 9   WITH - 6
AIRCRAFT TYPE - 5   CARRYING - 40   TYPE - 1   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 9   WITH - 9
AIRCRAFT TYPE - 5   CARRYING - 16   TYPE - 2   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 9   WITH - 6
AIRCRAFT TYPE - 5   CARRYING - 40   TYPE - 4   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 9   WITH - 2
AIRCRAFT TYPE - 5   CARRYING -400   TYPE - 5   AMMUNATION
 CONSIDERING RECYCLING OF AMMUNATION FOR TGT 3

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 3
AIRCRAFT TYPE - 5   CARRYING - 16   TYPE - 1   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 5
AIRCRAFT TYPE - 5   CARRYING -  8   TYPE - 2   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 2
AIRCRAFT TYPE - 5   CARRYING -  8   TYPE - 4   AMMUNATION

MISSION POSSIBLE FROM BASE-> 1   FOR TARGET TYPE - 3   WITH - 1
AIRCRAFT TYPE - 5   CARRYING - 80   TYPE - 5   AMMUNATION
 AMMUNATION AVAILABLE AT BASE 2
          TYPE - 1,  QTY - 130
          HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
            20
          TYPE - 2,  QTY - 120
          HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
            30
          TYPE - 3,  QTY -  30
          HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
            10
          TYPE - 4,  QTY - 180
          HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
            80
          TYPE - 5,  QTY -5000
          HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
          1000

               WEAPON OF EACH KIND TO TARGET 2
             AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
               6        4        3       11      308
               4       22        2       55      209
              10        4        5       14      483
               0        0        0        0        0
               0        0        0        0        0
               0        0        0        0        0
               0        0        0        0        0
               0        0        0        0        0
               0        0        0        0        0
```

```
MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 2    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 2    CARRYING = 80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 5
AIRCRAFT TYPE = 2    CARRYING =  8    TYPE = 2    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 2    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 2    CARRYING = 80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 2    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 2    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 2    CARRYING = 80    TYPE = 5    AMMUNATION
 AMMUNATION AVAILABLE AT BASE 3
 TYPE = 1,  QTY =  50
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  20
 TYPE = 2,  QTY =  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  10
 TYPE = 3,  QTY =  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  30
 TYPE = 4,  QTY = 300
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
  100
 TYPE = 5,  QTY =2750
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 1000

      WEAPON OF EACH KIND TO TARGET 3
    AMN-1   AMN-2   AMN-3   AMN-4   AMN-5
      5       1       9      15     308
      4       7       6      68     209
     10       2      15      17     483
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0
      0       0       0       0       0

 MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 4    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 4    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION
```

```
MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 4    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 3    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 4    CARRYING = 80    TYPE = 5    AMMUNATION
 AMMUNATION AVAILABLE AT BASE 4
 TYPE = 1,   QTY =  30
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   10
 TYPE = 2,   QTY =  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE = 3,   QTY =  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   40
 TYPE = 4,   QTY = 190
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   80
 TYPE = 5,   QTY =3800
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 1000

      WEAPON OF EACH KIND TO TARGET 4
    AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
        3        4       12       11      309
        2       22        9       55      208
        5        4       19       14      483
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0
        0        0        0        0        0

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 2
AIRCRAFT TYPE = 3    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 3    CARRYING = 80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 5
AIRCRAFT TYPE = 3    CARRYING =  8    TYPE = 2    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 2
AIRCRAFT TYPE = 3    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 3    CARRYING = 80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 2
AIRCRAFT TYPE = 3    CARRYING =  8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 4    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 3    CARRYING = 80    TYPE = 5    AMMUNATION
 AMMUNATION AVAILABLE AT BASE 5
 TYPE = 1,   QTY =  60
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   30
 TYPE = 2,   QTY =  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   40
 TYPE = 3,   QTY = 120
```

```
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   40
 TYPE = 4,   QTY =  80
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
   40
 TYPE = 5,   QTY =4000
 HOW MUCH WOULD  YOU LIKE TO USE GIVE NUMBER
 2000

      WEAPON OF EACH KIND TO TARGET 5
    AMN-1    AMN-2    AMN-3    AMN-4    AMN-5
       9        5       13        6      620
       6       29        8       28      412
      15        6       19        6      968
       0        0        0        0        0
       0        0        0        0        0
       0        0        0        0        0
       0        0        0        0        0
       0        0        0        0        0
       0        0        0        0        0
       0        0        0        0        0

MISSION POSSIBLE FROM BASE-> 5    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 1    CARRYING =  80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 5    FOR TARGET TYPE = 3    WITH = 5
AIRCRAFT TYPE = 1    CARRYING =   8    TYPE = 2    AMMUNATION

MISSION POSSIBLE FROM BASE-> 5    FOR TARGET TYPE = 3    WITH = 3
AIRCRAFT TYPE = 1    CARRYING =   8    TYPE = 4    AMMUNATION

MISSION POSSIBLE FROM BASE-> 5    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 1    CARRYING =  80    TYPE = 5    AMMUNATION

MISSION POSSIBLE FROM BASE-> 5    FOR TARGET TYPE = 3    WITH = 1
AIRCRAFT TYPE = 1    CARRYING =  80    TYPE = 5    AMMUNATION
 CONSIDERING TARGET TYPE = 2  PRIORITY = 1

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 5  FROM BASE = 1  WITH AMN OF TYPE = 1
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 1
 TYPE OF AIRCRAFT

 5
 TYPE OF AMMUNATION

 1
 CONSIDERING TARGET TYPE = 9  PRIORITY = 2

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE = 2  FROM BASE = 2  WITH AMN OF TYPE = 5
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION REDO
 FOR BASE TYPE-1
FOR AC TYPE-2
FOR BOTH TYPE-3
 TYPE:
 1
```

```
 GIVE BASE NUMBER:

 3
      BASE TYP OF AC AMN TYP NO OF AC
        3         4         4         3
        3         4         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE BASE NUMBER:

 5
      BASE TYP OF AC AMN TYP NO OF AC
        5         1         2         5
        5         1         4         3
        5         1         5         1
 WOULD YOU LIKE TO SEE ANOTHER BASE ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 3
 TYPE OF AIRCRAFT

 4
 TYPE OF AMMUNATION

 4
 CONSIDERING TARGET TYPE - 3  PRIORITY - 3

BEST POSSIBLE SOLUTION IS --
  1  ACS OF TYPE - 5  FROM BASE - 1  WITH AMN OF TYPE - 5
 IS THIS SOLUTION ACCEPTABLE TO YOU ?

GIVE BASIS OF SOLUTION READ
 FOR BASE TYPE=1
FOR AC TYPE=2
FOR BOTH TYPE=3
 TYPE:

 2
 GIVE AIRCRAFT TYPE:

 1
      BASE TYP OF AC AMN TYP NO OF AC
        5         1         5         1
 WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE AIRCRAFT TYPE:

 1
      BASE TYP OF AC AMN TYP NO OF AC
        5         1         5         1
 WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?

GIVE YOUR SOLUTION
 STRIKE FROM
 BASE:

 5
 TYPE OF AIRCRAFT

 1
 TYPE OF AMMUNATION

 5
 BEST OF LUCK FOR MISSION SELECTED
```

CLOSE AIR SUPPORT REQUEST NO : 5

TARGET COORDINATE : 001 EAST , 999 NORTH

* WEATHER OVER TARGET : 1

[1=CLEAR ,2=LOW CAST ,3=HIGH CAST ,4=HAZE ,5=LIGHT RAIN
6=MOD RAIN,7=HEAVY RAIN,8=LI FOG DUST ,9=MOD FOG DUST
10=HEAVY FOG DUST]

TIME ON TARGET ,REQUESTED : 220430

* PRESENT TIME : 211800

TARGET TYPE : 2,3,4

[1=TNKS,2=BNKRS,3=GUN POS,4=VEHICLES,5=BRIDGES,
6=TROOPS,7=SUPPLS,8=C.P.,9=AMMO,10=P.O.L.]

QUANTITY : 7,8,9

[1=1-5,2=6-10,3=11-20,4=21-30,5=31-40,6=41-50,7=51-100
8=BATT,9=BRIG,10=DIV]

DESIRED RESULT : 2

[1=DESTROY,2=INTRIDICT,3=NEUTRALISE,4=HARASS]

*= TO BE FILLED BY AIR AUTHORITY

```
GIVE APPROX SIX FIGURE GRID REF OF TGT
 1999
GIVE TYPE OF WEATHER NO. FROM 1 TO 10
 1
GIVE SIX FIGURE TIME OF STRIKE REQUIRED
220430
GIVE PRESENT TIME IN SIX FIGURES
211800
                DEMAND MATRIX
   TOT       VOT       NOT       TTV       POH
 2.000     1.000     7.000     7.000     1.000
 3.000     0.500     8.000     4.000     3.000
 4.000     0.500     9.000     5.000     2.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000
 0.000     0.000     0.000     0.000     0.000

          DIST OF TGT FROM BASES
     953       835       394       840       661
STRIKE POSSIBLE FROM THE FOLLOWING BASES

RY! MISSION NOT POSSIBLE
```

APPENDIX D

```
00100      C  ------------------------------------------
00200      C                DECLARATIONS
00300      C  ------------------------------------------
00400           INTEGER DIST,TEMRNG,DIRECT(5,5),INDRCT(5,5)
00500      C    DIST->temp storage of distance
00600      C    TEMRNG->temp storage of range from tgt to base
00700      C    DIRECT->matrix for direct strike-COLN->no of
00800      C    1 bases;VALUE->ac type
00900      C    INDRCT->matrix for indirect strike;
01000      C    1 COLN-> striking base; ROW ->typ of
01100      C    1 ac used;VALUE-> stop over bases;
01200      C  ------------------------------------------
01300           INTEGER TOTTIM,TEMTYP,TAKOFF,RUNTIM
01400           INTEGER TEMBSE,DIST1,TOTDIS
01500      C  ------------------------------------------
01600      C    TOTTIM->total time taken by the ac to
01700      C    1 reach the target
01800      C    TEMTYP,TEMBSE,DIST1->temp variables used for
01900      C    1 typ of ac,bases,dist
02000      C    TAKOFF->time taken by the ac for takeoff
02100      C    RUNTIM->time taken by the ac to reach
02200      C    1 from one point to another
02300      C    TOTDIS->total distance from base to target
02400      C    TEMBSE->TEMmP BASE
02500      C  ------------------------------------------
02600           INTEGER BSERNG(5,5),BASE(5),FUELTM,TGTLOC
02700      C  ------------------------------------------
02800      C    BSERNG->matrix containing distances between
02900      C    1 different bases
03000      C    BASE->matrix containing dist from bases to target
03100      C    FUELTM->time taken by the ac for refueling
03200      C    TGTLOC->location of the targget in six figures
03300      C    1 grid reference
03400      C  ------------------------------------------
03500           INTEGER PRSNTM,STRKTM,AVALTM
03600      C  ------------------------------------------
```

```
03700      C       PRSNTM->time at which demand was given
03800      C       STRKTM->time at which the strike is required
03900      C       AVALTM->the total time that is avalable for strike
04000      C       MATRIX B -> DATA FOR DIFFERENT BASES
04100      C       MATRIX A-> DATA FOR DIFFERENT  AIRCRAFTS
04200      C       MATRIX T -> DATA FOR DIFFERENT TARGETS
04300              DIMENSION ANAMEB(15,10),ANAMEA(15,10),ANAMET(15,10)
04400              INTEGER B(15,5),A(15,5) ,T(15,6), TGTRNG(5)
04500              INTEGER TOTAMN,ACBASE(5,5)
04600              INTEGER BSEROW,BSECOL,AIRROW,AIRCOL,TGTROW,
04700             1 TGTCOL,NOBASE,TYPAC
04800      C       THIS IS TARGET/WEAPON ALLOCATION PROBLEM PART
04900              REAL M,C,B11,LAMDA,LOGVAL
05000              INTEGER TOTAL,WPNPRB
05100              DIMENSION TGTVAL(10)
05200              DIMENSION VAL(10)
05300              INTEGER RES(5)
05400              LOGICAL ANS,RESLT
05500              DIMENSION  PROBMT(10,6),PROBNW(10,6)
05600              DIMENSION  MJ(2,10)
05700              DIMENSION  NEGMAT(25)
05800              DIMENSION RESTOR(5,10)
05900              DIMENSION TEMP(5)
06000              DIMENSION TEMPMT(20)
06100              INTEGER WPNMAT(10,5)
06200              INTEGER STOREN(25),TOTNUM
06300              INTEGER STRIKE(5),CHKAMN,AMNOUT(10,5)
06400              DIMENSION DEMAND(10,5)
06500              DIMENSION ANAMEW(15,10)
06600              INTEGER WTRCOL,WTRROW  ,TIMEHR
06700              INTEGER ATRMAT(10,5),WATHER(15,6)
06800              INTEGER PILOTS(15,10),CREWMT(15,10),REQPLT,WEATHR
06900              DIMENSION ANAMEC(15,10),ANAMEP(15,10)
07000              INTEGER CRWCOL,CRWROW,PLTROW,PLTCOL
07100              INTEGER BALNCE(5),RECYLE
07200              LOGICAL TGTDNE(10),ADDED,CHOICE
```

```
      INTEGER OPTION(10,5,5,5),OPTBSE,OPTAC,OPTAMN
C     ********************************************
C     Data files input & output
C     ********************************************
      OPEN (UNIT=21,FILE='DATA1')
      OPEN(UNIT=22,FILE='DATA2.DAT')
      OPEN(UNIT=23,FILE='DATA3.DAT')
C     OPEN(UNIT=24,FILE='DETAIL.DAT')
C     ----------------------------------------------
C     Read input data
C     ----------------------------------------------
      READ (21,*) BSEROW,BSECOL,AIRROW,AIRCOL,
     1 TGTROW,TGTCOL,NOBASE,IYPAC
      READ (21,*) ((B(I,J),J=1,BSECOL),I=1,BSEROW)
      READ (21,*)((A(I,J) ,J=1,AIRCOL),I=1,AIRROW)
      READ (21,*) ((T(I,J),J=1,TGTCOL),I=1,TGTROW)
      READ(21,10) ((ANAMEB(I,J),J=1,10),I=1,BSEROW)
      READ (21,10)((ANAMEA(I,J),J=1,10),I=1,AIRROW)
      READ (21,10) ((ANAMET(I,J),J=1,10),I=1,TGTROW)
      READ(22,*),  TOTAL,WPNPRB
      READ(22,*),  MMAX
      READ(22,*),((PRORMT(I,J),I=1,TOTAL),J=1,WPNPRB+1)
      READ(22,*),((MJ(I,J),I=1,2),J=1,MMAX)
      READ(22,*),(RES(I),I=1,MMAX)
      READ (22,*),((ATRMAT(I,J),J=1,5),I=1,10)
      READ(22,*),WTRROW,WTRCOL
      READ(22,*),((WATHER(I,J),J=1,WTRCOL),I=1,WTRROW)
      READ(22,10)((ANAMEW(I,J),J=1,10),I=1,WTRROW)
      READ(23,*),CRWROW,CRWCOL,PLTROW,PLTCOL
      READ(23,*),((CREWMT(I,J),J=1,CRWCOL),I=1,CRWROW)
      READ(23,*),((PILOTS(I,J),J=1,PLTCOL),I=1,PLTROW)
      READ(23,10),((ANAMEC(I,J),J=1,10),I=1,CRWROW)
      READ(23,10),((ANAMEP(I,J),J=1,10),I=1,PLTROW)
10    FORMAT(10A1)
      CONTINUE
      GO TO 120
```

```
10900      C     _*************************************************
11000      C     Program Starting
11100      C     -------------------------------------------------
11200      C     Printing data of BASES
11300      C     -------------------------------------------------
11400            PRINT  20
11500      C     TYPE 20
11600      20    FORMAT(30X,'DATA OF BASES'//17X,'BASE-1',5X,
11700            1'BASE-2',5X,'BASE-3',5X,'BASE-4',5X,'BASE-5'//)
11800      C     DO 40 I=1,NOBASE
11900      C     PRINT 30 ,I
12000      30    FORMAT(1H+,10X,'BASE',I1,$)
12100      40    CONTINUE
12200            CALL  PRIMAT(ANAMEB,B,BSEROW,BSECOL)
12300      C     -------------------------------------------------
12400      C     Printing data of AIRCRAFTS
12500      C     -------------------------------------------------
12600            PRINT 50
12700      C     TYPE 50
12800      50    FORMAT(/30X,'DATA OF AIRCRAFTS'// 20X'AC-1',6X,
12900            1'AC-2',6X,'AC-3',6X,'AC-4',6X,'AC-5'//)
13000      C     DO 70 I=1,AIRCOL
13100      C     PRINT 60 ,I
13200      60    FORMAT (1H+,10X,'AC',I5,$)
13300      70    CONTINUE
13400            CALL  PRIMAT(ANAMEA,A,AIRROW,AIRCOL)
13500      C     -------------------------------------------------
13600      C     Printing data of TARGETS
13700      C     -------------------------------------------------
13800            PRINT 80
13900      C     TYPE  80
14000      80    FORMAT(/30X,'DATA OF TARGET'//19X,'TGT STR',2X,
14100            1'WPN TYP-1',1X,'WPN TYP-2',1X,'WPN TYP-3',1X,
14200            1'WPN TYP-4',1X,'WPN TYP-5'//)
14300            CALL PRIMAT(ANAMET,T,TGTROW,TGTCOL)
14400      C     -------------------------------------------------
```

```
14500      C       Printing data of WEATHER
14600      C       ------------------------------------------------
14700      C       TYPE 90
14800              PRINT 90
14900      90      FORMAT(/30X,'WEATHER DATA'//17X,
15000             1'VISIBILITY',4X,'AC-1',6X,'AC-1',
15100             26X,'AC-3',6X,'AC-4',6X,'AC-5'//)
15200              CALL PRINAT(ANAMEW,WATHER,WTRROW,WTRCOL)
15300      C       ------------------------------------------------
15400      C       Printing crew requirement data
15500      C       ------------------------------------------------
15600      C       TYPE 100
15700              PRINT 100
15800      100     FORMAT(/30X,'CREW REQUIRMENT DATA'//17X,
15900             1 'AC-1', 6X,'AC-2',6X,'AC-3',6X,'AC-4',6X,'AC-5'//
16000              CALL PRINAT(ANAMEC,CREWMT,CRWROW,CRWCOL)
16100      C       ------------------------------------------------
16200      C       Printing pilot status at bases
16300      C       ------------------------------------------------
16400      C       TYPE 110
16500              PRINT 110
16600      110     FORMAT(/30X,'PILOTS POSITION ON BASES'//17X,
16700             1 'BASE-1',4X,'BASE-2',4X,'BASE-3',4X,'BASE-4',4X,
16800             2 'BASE-5'//)
16900              CALL PRINAT(ANAMEP,PILOTS,PLTROW,PLTCOL)
17000      C       ------------------------------------------------
17100      C       Calculate distance between bases & print
17200      C       ------------------------------------------------
17300      120     DO 130 I=1,NOBASE
17400              BASE(I)=B(1,I)
17500      130     CONTINUE
17600              DO 140 I=1,NOBASE
17700              DO 140 J=1,NOBASE
17800              CALL RANGE (BASE(I),BASE(J),DIST)
17900              BSERNG(I,J)=DIST
18000      140     CONTINUE
```

```
18100       C       PRINT 150
18200       150     FORMAT(//10X,'DISTANCE FROM ONE BASE TO OTHER'//)
18300       C       PRINT 160
18400       160     FORMAT(12X,'1',6X,'2',6X,'3',6X,'4',6X,'5'//)
18500               DO 180 IJ=1,NOBASE
18600       C       PRINT 170 ,IJ,(BSERNG(IJ,JK) ,JK=1,5)
18700       170     FORMAT(10X,I2,5I6//)
18800       180     CONTINUE
18900       C       **************************************************
19000       C       Take in demand for Exercise
19100       C       **************************************************
19200       190     TYPE 210
19300               DO 200 II1=1,10
19400               DO 200 II2=1,5
19500               DO 200 II3=1,5
19600               DO 200 II4=1,5
19700       200     OPTION(II1,II2,II3,II4)=0
19800       210     FORMAT(//10X,'GIVE APPROX SIX FIGURE GRID REF OF TG
19900               PRINT 210
20000               ACCEPT *,TGTLOC
20100               PRINT 215 ,TGTLOC
20200       215     FORMAT(/10X,I6)
20300               TYPE 220
20400       220     FORMAT(/10X,'GIVE TYPE OF WEATHER NO. FROM 1 TO 10'
20500               PRINT 220
20600               ACCEPT *,WEATHR
20700               PRINT 225 ,WEATHR
20800       225     FORMAT(/10X,I2)
20900               TYPE 230
21000       230     FORMAT(/10X,'GIVE SIX FIGURE TIME OF STRIKE REQUIRE
21100               PRINT 230
21200               ACCEPT *,STRKTM
21300               PRINT 235 ,STRKTM
21400       235     FORMAT(/10X,I6)
21500               TIMEHR=MOD(STRKTM,10000)
21600               TYPE 240
```

```
21700      240   FORMAT(/10X,'GIVE PRESENT TIME IN SIX FIGURES')
21800            PRINT 240
21900            ACCEPT *,PRSNTM
22000            PRINT 245 ,PRSNTM
22100      245   FORMAT(/10X,I6)
22200      250   NOFTGT=0
22300            TYPE 260
22400      260   FORMAT(/10X,'NOTE:DEGREE OF NUETRALISATION IS')
22500            TYPE  270
22600      270   FORMAT (/10X,'COMPLETE(DESTROY)-4'/10X,'INTERDICTION-
22700           1  /10X,'NUETRALIZE-2 '/10X,'HARRASSED-1'/)
22800            DO 280 INTROW=1,10
22900            DO 280 INTCOL=1,5
23000      280   DEMAND (INTROW,INTCOL)=0.0
23100            TYPE 285
23200      285   FORMAT(/10X,'AT END GIVE ZERO FOR TGT TYP')
23300      290   TYPE 300
23400      300   FORMAT(//10X,'TYPE OF TARGET:',$)
23500            ACCEPT*,TARGET
23600            IF(TARGET.EQ.0.0) GO TO 370
23700            TYPE 310
23800      310   FORMAT(/10X,'NO OF TARGETS:',$)
23900            ACCEPT *,TGTNOS
24000            TYPE 320
24100      320   FORMAT (/10X,'GIVE DEGREE OF NUETRALIZATION REQD:',$)
24200            ACCEPT *,IDEGRE
24300            NUTRZE= IDEGRE *25
24400            ITEMP=IFIX(TARGET)
24500            VALUE=T(ITEMP,1)/10.0
24600            ITOTAL=((T(ITEMP,1)*TGTNOS)+5)/10
24700            TOTVAL=FLOAT (ITOTAL)
24800            IF(TOTVAL.LE.10.0) GO TO 340
24900            TYPE330
25000      330   FORMAT(10X,'DEMAND TOO BIG-CANNOT BE TAKEN UP'/)
25100            GO TO 290
25200      340   IF(NOFTGT.NE.10)GO TO 360
```

```
25300           TYPE 350
25400     350   FORMAT (10X,'Can not take more than 10 demands
25500           1  would you like to amend demands ,otherwise
25600           2  these 10 will betaken ?')
25700           CALL REPLY (ANS)
25800           IF (ANS.EQ.'Y') GO TO 250
25900           GO TO 370
26000     360   NOFTGT=NOFTGT+1
26100           DEMAND(NOFTGT,1)=TARGET
26200           DEMAND(NOFTGT,2)=VALUE
26300           DEMAND(NOFTGT,3)=IGTNOS
26400           DEMAND(NOFTGT,4)=TOTVAL
26500           GO TO 290
26600     C     ----------------------------------------------
26700     C     Taking probability for types of targets being used
26800     C     1 from "PROBMT" and storing it in "PROBNW"
26900     C     ----------------------------------------------
27000     370   ICOUNT=0
27100           DO 380 I=1,TOTAL
27200           DO 380J=1,NOFTGT
27300           IF(PROBMT(11-I,1).NE.DEMAND(J,4)) GO TO 380
27400           ICOUNT=ICOUNT+1
27500           DEMAND(J,5)=ICOUNT
27600           ITEMP=I
27700           CALL TRNSFR(PROBMT,PROBNW,ITEMP,ICOUNT)
27800           IF(ICOUNT.EQ.NOFTGT) GO TO 390
27900     380   CONTINUE
28000     C     ----------------------------------------------
28100     C     Typing out the "DEMAND" matrix with their priorities
28200     C     1 calculated and assigned for each TARGET
28300     C     ----------------------------------------------
28400     390   TYPE 400
28500     C     1 ,((DEMAND(I1,J1),J1=1,5),I1=1,10)
28600     400   FORMAT(/25X,'DEMAND MATRIX'//14X,'TOT',5X,
28700           2'VOT',5X,'NOT',5X,'TTV',5X,'POH'//(10X,5F8.3))
28800     C     TOT ->TYPE OF TARGET FROM 1 TO 10
```

```
28900      C        VOT -> VALUE OF ONE TARGET
29000      C        NOT -> NUMBER OF SUCH TARGETS
29100      C        TTV -> TARGET TOTAL VALUE FOR HIT
29200      C        POH -> PRIORITY OF HIT HIGHEST=10 AND SO ON
29300               PRINT 400 ,((DEMAND(I1,J1),J1=1,5),I1=1,10)
29400      C        ------------------------------------------------
29500      C        Calculating DISTANCE of TARGET from each BASE and
29600      C        I storing it in "TGTRNG"
29700      C        ------------------------------------------------
29800               DO 410 I=1,NOBASE
29900               CALL RANGE(BASE(I),TGTLOC,DIST)
30000               TGTRNG(I)=DIST
30100      410      CONTINUE
30200               TYPE 420 ,(TGTRNG(I),I=1,5)
30300      420      FORMAT(//20X,'DIST OF TGT FROM BASES'//10X,(5I8))
30400               PRINT 420,(TGTRNG(I),I=1,5)
30500      C        ************************************************
30600      C        Check with each base & AC for mission possibility
30700      C        ************************************************
30800      C        Check for direct misson possibility
30900      C        ------------------------------------------------
31000               CALL INITS(DIRECT,NOBASE,NOBASE)
31100               CALL INITS(INDRCT,TYPAC,NOBASE)
31200               CALL INITS (ACBASE,5,5)
31300               DO 450 I=1,NOBASE
31400               IFLAG=0
31500               TEMRNG=TGTRNG(I)
31600               ICOUNT=0
31700               DO 450 J=1,TYPAC
31800               IF(B(J+5,I).EQ.0) GO TO 450
31900               IF (WATHER(B(2,I),J+1).EQ.0) GO TO 450
32000               IF (WATHER(WEATHR,J+1).EQ.0) GO TO 450
32100               IF (TEMRNG.GT.A(8,J)) GO TO 430
32200               ICOUNT=ICOUNT+1
32300               DIRECT(ICOUNT,I)=J
32400               GO TO 450
```

```
C     ------------------------------------------------
C     Check for INDIRECT misson possibility
C     ------------------------------------------------
      DO 450 K=1,NOBASE
      IF (K.EQ.I) GO TO 450
      IF (A(8,J) .LT. TGTRNG(K)) GO TO 450
      IF (A(8,J).LT.BSERNG(I,K)) GO TO 450
      IF(B(4,I).EQ.0) GO TO 450
      IF (B(5,I).EQ.0) GO TO 450
      IF ((TIMEHR.LT.1800).AND.(TIMEHR.GT.600)) GO TO 440
      IF (B(3,I).EQ.0) GO TO 450
  440 INDRCT(J,I)=K
  450 CONTINUE
C     ------------------------------------------------
C     TIME CONSIDERAYION - checking for time available for
C     1 mission under consideration
C     ------------------------------------------------
C     THIS IS TIME CALCULATION FOR FLYING
C     PRSNTM -PRESENT TIME
C     STRKTM -TIME AT WITCH STRIKE IS REQUIRED
C     1 OVER ENEMY AREA
      CALL CALTIM(PRSNTM,STRKTM,AVALTM)
      DO 480 I=1,NOBASE
      TOTTIM=0
      DO 460 J=1,TYPAC
      IF (DIRECT(J,I).EQ.0) GO TO 470
      TEMTYP=DIRECT(J,I)
      TAKOFF=A(6,TEMTYP)
      RTIME=(TGTRNG(I)*60)/A(7,TEMTYP)
      RUNTIM=IFIX(RTIME)
      TOTTIM=TAKOFF+RUNTIM
      IF (TOTTIM.LE.AVALTM)GO TO 460
      DIRECT(J,I)=0
  460 CONTINUE
  470 DO 480 K=1,TYPAC
      IF (INDRCT(K,I).EQ.0) GO TO 480
```

```
36100                TEMBSE=INDRCT(K,I)
36200                TAKOFF=A(6,K)*2
36300                DIST1=BSERNG(I,TEMBSE)
36400                TOTDIS=DIST1+TGTRNG(TEMBSE)
36500                RUNTIM=TOTDIS/A(7,K)
36600                FUELTM=A(10,K)
36700                TOTTIM=TAKOFF+RUNTIM+FUELTM
38000                IF (TOTTIM.LE.AVALTM) GO TO 480
38900                INDRCT(K,I)=0
37000          150   CONTINUE
37100          C     ------------------------------------------
37200          C     Printing matrices for "INDIRECT"and "DIRECT"
37300          C     possibilities considering TIME,DISANCE
37400          C     1 and overall possibility from BASES
37500          C     ------------------------------------------
37600          C     PRINT  490
37700          490   FORMAT(//15X,'DIRECT MATRIX'//)
37800          C     TYPE 500,((DIRECT(I,J),J=1,5),I=1,5)
37900          500   FORMAT(10X,5I4/)
38000          C     PRINT  500 ,((DIRECT(I,J),J=1,5),I=1,5)
38100          C     PRINT  510
38200          510   FORMAT (15X,'INDIRECT MATRIX'//)
38300          C     TYPE 500,((INDRCT(I,J),J=1,5),I=1,5)
38400          C     PRINT  500 ,((INDRCT(I,J),J=1,5),I=1,5)
38500          C     CALL INIT(STRIKE,1,NOBASE)
38600                DO 520 LL=1,5
38700          520   STRIKE(LL)=0
38800                CALL CHKBSE(DIRECT,STRIKE,TYPAC,NOBASE)
38900                CALL CHKBSE(INDRCT,STRIKE,TYPAC,NOBASE)
39000                TYPE 530
39100          530   FORMAT(/10X,'STRIKE POSSIBLE FROM
39200                1 THE FOLLOWING BASES'/)
39300                PRINT  530
39400                ICHECK=0
39500                DO 550 I=1,NOBASE
39600                IF(STRIKE(I).EQ.0) GO TO 550
```

```
39700                TYPE 540,I
39800      540       FORMAT(10X,'BASE->',I2//)
39900                PRINT  540 ,I
40000                ICHECK=1
40100      550       CONTINUE
40200                IF(ICHECK.EQ.1) GO TO 570
40300                TYPE 560
40400      560       FORMAT(/10X,'SORRY!THIS MISSION IS NOT POSSIBLE
40500                1 FROM ANY OF THE BASES'/)
40600                GO TO 1240
40700      570       TOTNUM=NOFTGT
40800      C         ------------------------------------------
40900      C         Combining "DIRECT "and "INDIRECT" for other
41000      C         considerations for AIRCRAFT and AMMUNATION
41100      C         ------------------------------------------
41200      C         COMBINE DIRECT AND INDIRECT MATRICES TO GIVE
41300      C         OVERALL FEASSIBILITY
41400                DO 600 I=1,NOBASE
41500                IEMPTY=0
41600                DO 580 J=1,TYPAC
41700                IF (DIRECT(J,I).NE.0) GO TO 580
41800                IEMPTY=J
41900                GO TO 590
42000      580       CONTINUE
42100      590       DO 600 K=1,TYPAC
42200                IF (INDRCT(K,I).EQ.0) GO TO 600
42300                DIRECT(1,IEMPTY)=K
42400                IEMPTY=IEMPTY+1
42500      600       CONTINUE
42600      C         ------------------------------------------
42700      C         Taking AMMUNATION allocation for the mission
42800      C         from different BASES
42900      C         ------------------------------------------
43000                DO 1010 II=1,NOBASE
43100                IF (STRIKE(II).EQ.0) GO TO 1010
43200                TYPE 610,II
```

```
43300      610   FORMAT (/10X,'AMMUNATION AVAILABLE AT BASE',I2)
43400            PRINT 610 ,II
43500            DO 710 JJ=1,MMAX
43600            IF (B(10+JJ,II).EQ.0)GO TO 700
43700            CHKAMN=0
43800            DO 620 KK=1,TYPAC
43900            IF (DIRECT(KK,II).EQ.0) GO TO 620
44000            IF(A(JJ,DIRECT(KK,II)).EQ.0) GO TO 620
44100            CHKAMN=1
44200            GO TO 630
44300      620   CONTINUE
44400      630   IF(CHKAMN.EQ.0) GO TO 700
44500      640   TYPE 650,JJ,B(10+JJ,II)
44600      650   FORMAT(/10X,'TYPE -',I2,',',2X,'QTY -',I4//
44700            1 10X,'HOW MUCH WOULDYOU LIKE TO USE GIVE NUMBER')
44800            PRINT 650 ,JJ,B(10+JJ,II)
44900            ACCEPT *,NOUSE
45000            PRINT 655,NOUSE
45100      655   FORMAT(/10X,I4)
45200            IF (B(10+JJ,II).GE.NOUSE) GO TO 670
45300            TYPE 660
45400      660   FORMAT (10X,'Ammunation allotedis more than that
45500            1   is available.Give again  ->')
45600            GO TO 640
45700      670   IF((B(10+JJ,II)-NOUSE).GT.RES(JJ)) GO TO 690
45800            TYPE 680
45900      680   FORMAT(/10X,'YOUR RESERVE AMMUNATION REQUIRED'/10X,
46000            1 'LIKE TO USE RESERVE AMN -TYPE YES/NO'/)
46100            PRINT 680
46200            CALL REPLY(ANS)
46300            IF(ANS.EQ.'N') GO TO 640
46400      690   MJ(1,JJ)=NOUSE
46500            GO TO 710
46600      700   MJ(1,JJ)=0
46700      710   CONTINUE
46800      C     ************************************************
```

```
46900      C     CALCULATE ALLOCATTION OF AMMUNATIO FOR THE TARGETS
47000      C     1 CONSIDERING PROBABILITY OF HIT, VALUE OF TARGET
47100      C     AND PRIORITY OF TARGETS UNDER CONSIDERATION
47200      C     ************************************************
47300      C     Calculate weightage factor for different ammunation
47400      C     and overall weightage "M"
47500      C     ------------------------------------------------
47500      C     CALCULATION OF M
47700            M=0
47800            DO 720 I=1,MMAX
47900            M=M+MJ(1,I)/MJ(2,I)
48000      720   CONTINUE
48100      C     TYPE *,M
48200            DO 830 J=1,NPNPRB
48300            DO 730 N=1,TOTNUM+1
48400            STOREN(N)=1
48500      730   CONTINUE
48600      C     ------------------------------------------------
48700      C     Calculate ammunation allocation for targets
48800      C     ------------------------------------------------
48900      740   SUM=0.0
49000            STOREN(TOTNUM+1)=1
49100            DO  760 N=1,TOTNUM
49200            IF(STOREN(N).EQ.0) GO TO 760
49300      C     CALCULATE C ,B
49400            C=0.0;B11=0.0
49500            DO 750 NC=1,NOFTGT
49600            IF(STOREN(NC).EQ.0) GO TO 750
49700            QI=1.0-PROBNW(NC,J+1)
49800            LOGVAL=ALOG(1.0/QI)
49900      C     TYPE*,LOGVAL
50000            C=C+(1.0/LOGVAL)
50100            B11=B11+ALOG((PROBNW(NC,1))*LOGVAL)/LOGVAL
50200      750   CONTINUE
50300            LAMDA=(B11-M)/C
50400            LOGVAL=ALOG(1.0/(1.0-PROBNW(N,J+1)))
```

```
50500                 S=(ALOG(PROBNW(N,1))-LAMDA+ALOG(LOGVAL))/LOGVAL
50600       F         TYPE *, S,J,N
50700                 RESTOR(J,N)=S
50800                 SUM=SUM+S
50900                 IF(S.GE..0) GO TO 760
51000                 STOREN(TOTNUM+1)=0
51100                 STOREN (N)=0
51200                 RESTOR(J,N)=0.0
51300       760       CONTINUE
51400                 IF(STOREN(TOTNUM+1).EQ.0) GO TO 740
51500       C         TYPE 770,J
51600       770       FORMAT(30X,'T A R G E T   P R O B NO ',I2)
51700       C         TYPE 780
51800       780       FORMAT(10X,'TARGET VALUE',10X,'PROBABILITY OF HIT',
51900                 1 10X,'FINAL WEAPON ALLOCATION')
52000                 DO 800 I=1,TOTNUM
52100       C         TYPE 790,PROBNW(I,1),PROBNW(I,J+1),RESTOR(J,I)
52200       790       FORMAT(16X,F4.1,20X,F4.2,22X,F6.2/)
52300       800       CONTINUE
52400       C         TYPE*,SUM
52500                 IF(ABS(SUM-M).LE.(0.05*M)) GO TO 830
52600                 TYPE 820
52700       820       FORMAT(1H0,'RESULT NOT POSSIBLE')
52800       830       CONTINUE
52900       C         CALCULATE XIJ =WEAPON OF EACH TYPE TO TARGETS
53000                 DO 890 J=1,MMAX
53100                 DO 860 K=1,MMAX
53200                 FACTOR=MJ(1,K)/M
53300                 DO 840 I=1,TOTNUM
53400                 VALUE =RESTOR(J,I)*FACTOR
53500                 WPNMAT(I,K)=IFIX(VALUE)
53600                 TEMPMT(I)=VALUE-WPNMAT(I,K)
53700       840       CONTINUE
53800       C         ----------------------------------------------------
53900       C         Round up allocation of ammunation for final distribu
54000       C         ----------------------------------------------------
```

```
54100      C        DECIDE FOR NO OF TARGETS
54200               ISUM=0
54300               DO 850 I=1,TOTNUM
54400               ISUM=ISUM+WPNMAT(I,K)
54500      850      CONTINUE
54600               IF (ISUM.EQ.MJ(1,K)) GO TO 860
54700               DO 860 I=1,(MJ(1,K)-ISUM)
54800               CALL CHKMAX (TEMPMT,NUM,TOTNUM)
54900               TEMPMT(NUM)=0
55000               WPNMAT(NUM,K)=WPNMAT(NUM,K)+1
55100      860      CONTINUE
55200               DO 870 IK=1,10
55300               AMNOUT(IK,J)=WPNMAT(IK,J)
55400      870      CONTINUE
55500      C        TYPE WPNMATRIX
55600      C        TYPE 880 ,J,((WPNMAT(L,M1),M1=1,5),L=1,10)
55700      880      FORMAT(//16X,'WEAPON OF EACH KIND TO TARGET',
55800               1 I2,// 14X,'AMN-1 ',2X'AMN-2 ',2X,'AMN-3 ',2X,
55900               2 'AMN-4 ',2X,'AMN-5 '//(10X,5I8/))
56000      890      CONTINUE
56100               TYPE 880,II,((AMNOUT(L,M1),M1=1,5),L=1,10)
56200               PRINT 880 ,II,((AMNOUT(L,M1),M1=1,5),L=1,10)
56300      C        ************************************************
56400      C        CHECKING FEASIBILITY OF NUETRALISING THE TARGET
56500      C        WITH ALLOCATED AMMUNATION
56600      C        ************************************************
56700      C        Checking for ammunation
56800      C        ------------------------------------------------
56900      C        INNITIALISE
57000               DO 900 IKJ=1,5
57100               BALNCE(IKJ)=0
57200      900      TGTDNE(IKJ)=.FALSE.
57300               RECYLE=0
57400      910      DO 990 I=1,NOFTGT
57500               IF (RECYLE.EQ.0)GO TO 940
57600               IF (TGTDNE(I).EQ..TRUE.) GO TO 990
```

```
57700            TYPE 920,I
57800            PRINT 920,I
57900      920   FORMAT (/10X,'COSIDERING RECYCLING OF AMMUNATION
58000           1  FOR TGT',I2)
58100            DO 930 IKJ=1,5
58200      930   AMNOUT(I,IKJ)=BALNCE(IKJ)
58300            IIMP=I
58400      940   CALL FNDTGT(DEMAND,ITMP,NOFTGT,NO)
58500            IIROW=IFIX(DEMAND(NO,1))
58600            DO 980 K=1,5
58700            ADDED=FALSE
58800            IF (T(IIROW,K+1).EQ.0)GO TO 980
58900            TOTAMN=IFIX(DEMAND(NO,3)*T(IIROW,K+1)*NUTRZE/100)
59000            IF (TOTAMN.GT.AMNOUT(I,K)) GO TO 980
59100            DO 970 L=1,TYPAC
59200            MASTER=0
59300            IF(DIRECT(L,II).EQ.0) GO TO 970
59400            IAC=DIRECT(L,II)
59500            IF(A(K,IAC).EQ.0) GO TO 970
59600      C     ------------------------------------------------------
59700      C     Calculate number and type of aircraft required with
59800      C     PILOTS available than indicate possibility of missio
59900      C     ------------------------------------------------------
60000      C     RACBA->Rqd ac before attrition
60100      C     IRACBA->integer part of RACBA
60200            RACBA=FLOAT(TOTAMN)/FLOAT(A(K,IAC))
60300            IRACBA=TOTAMN/A(K,IAC)
60400            REQAC=RACBA*(FLOAT(ATRMAT(IIROW,IAC))+100.0)/100.0
60500            IREQAC=IFIX(REQAC)
60600            IF((REQAC-IREQAC).GT.0.0) IREQAC=IREQAC+1
60700      C     AVALAC=B(5+IAC,II)-ACBASE(IAC,II)
60800            AVALAC=B(5+IAC,II)
60900            IF(AVALAC.LT.IREQAC) GO TO 970
61000            IF(WEATHR.GE.6) MASTER=5
61100      C     REQPLT=IREQAC*(CREWMT(1,IAC)+CREWMT(2,IAC))
61200            REQPLT=IREQAC*CREWMT(1,IAC)
```

```
61300           IF (REQPLT.GT.PILOTS(MASTER+IAC,II)) GO TO 970
61400           ACBASE(IAC,II)=ACBASE(IAC,II)+IREQAC
61500           BALNCE(K)=(AMNOUT(I,K)-TOTAMN)
61600           ADDED=TRUE
61700           TGTDNE(I)=.TRUE.
61800           TYPE 950,II,ITROW,IREQAC,IAC,TOTAMN,K
61900           PRINT 950 ,II,ITROW,IREQAC,IAC,TOTAMN,K
62000           OPTION(I,II,IAC,K)=IREQAC
62100     950   FORMAT(//10X,'MISSION POSSIBLE FROM BASE->',
62200          1 I2,3X,'FOR TARGET TYPE -',I2,3X,'WITH -',I2/10X,
62300          1 'AIRCRAFT TYPE -',I2,3X,'CARRYING -',I3,3X,
62400          1 'TYPE -',I2,3X,  'AMMUNATION  ')
62500           IF (MASTER.GT.0) GO TO 955
62600     955   TYPE 960,REQPLT
62700           PRINT 960, REQPLT
62800     960   FORMAT(10X,'NOTE ->',I2,'Master Green Pilots
62900          1  required for this mission')
63000           GO TO 980
63100     970   CONTINUE
63200     980   IF (ADDED.EQ.FALSE) BALNCE(K)=BALNCE(K)+AMNOUT(I,K)
63300     990   CONTINUE
63400           RECYLE=RECYLE+1
63500           IF (RECYLE.EQ.1)  GO TO 910
63600     C     TYPE 1000,((ACBASE(I1,J1),J1=1,5),I1=1,5)
63700     C     PRINT 1000 ,((ACBASE(I1,J1),J1=1,5),I1=1,5)
63800     1000  FORMAT(27X,'AC TO BASE'//(17X,5I5//))
63900     1010  CONTINUE
64000     C     ************************************************
64100     C     TAKE DECISION FOR TARGET NUETRALISATION AFTER GIVING
64200     C     "BEST" SOLUTION CONSIDERING ECONOMY OF FUEL,DISTANCE
64300     C     AIRCRAFT ,IN CASE BEST SOLUTION IS NOT ACCEPABLE THE
64400     C     SELECT ONE FROM ALTERNATIVES WHICH YOU FEEL BETTER
64500     C     ************************************************
64600           DO 1230 MM=1,NOFTGT
64700           MTMP=MM
64800           CALL FNDTGT(DEMAND,MTMP,NOFTGT,IROW)
```

```
64900                ITENTT=IFIX(DEMAND(IRON,I))
65000                TYPE 1020,ITENTT,MM
65100                PRINT 1020,ITENTT,MM
65200      1020      FORMAT(/10X,'CONSIDERING TARGET TYPE -',
65300                1 I2,2X,'PRIORITY -',I2/)
65400      C         ------------------------------------------------
65500      C         CALCULATE BEST SOLUTION
65600      C         ------------------------------------------------
65700                OPTBSE=1
65800                OPTAC =1
65900                OPTAMN=1
66000                DO 1050 I1=1,5
66100                DO 1050 I2=1,5
66200                DO 1050 I3=1,5
66300                IF (OPTION(MM,I1,I2,I3).EQ.0) GO TO 1050
66400                IF (OPTION(MM,OPTBSE,OPTAC,OPTAMN).EQ.0) GO TO 1040
66500                IF (OPTION(MM,I1,I2,I3)-OPTION(MM,OPTBSE,OPTAC,OPTAM
66600                1  1040,1030,1050
66700      1030      IF (OPTBSE.EQ.I1) GO TO 1050
66800                IF (BASE(OPTBSE).LT.BASE(I1)) GO TO 1050
66900      1040      OPTBSE=I1
67000                OPTAC =I2
67100                OPTAMN=I3
67200      1050      CONTINUE
67300                IF (OPTION(MM,OPTBSE,OPTAC,OPTAMN).EQ.0) GO TO 1210
67400                TYPE 1060,OPTION(MM,OPTBSE,OPTAC,OPTAMN)
67500                1 ,OPTAC,OPTBSE,OPTAMN
67600                PRINT 1060,OPTION(MM,OPTBSE,OPTAC,OPTAMN)
67700                1 ,OPTAC,OPTBSE,OPTAMN
67800      1060      FORMAT(/10X,'BEST POSSIBLE SOLUTION IS -',//10X,
67900                1 I2,2X,'ACS OF TYPE -',I2,2X,'FROM BASE -',I2,
68000                1  2X,'WITH AMN OF TYPE -',I2)
68100                TYPE 1070
68200                PRINT 1070
68300      1070      FORMAT (/10X,'IS THIS SOLUTION ACCEPTABLE TO YOU ?'
68400                CALL CHOICE(RESLT)
```

```
68500                IF(RESLT.EQ..FALSE.) GO TO 1080
68600                MTMP=MM
68700                CALL DECISN (B,OPTION,MTMP,A)
68800                GO TO 1230
68900      1080      TYPE 1090
69000                PRINT 1090
69100      1090      FORMAT(/10X,'GIVE BASIS OF SOLUTION REQD'
69200                1 //10X,'FOR BASE TYPE-1'/
69300                1 10X,'FOR AC TYPE-2'/10X,'FOR BOTH TYPE-3'//
69400                1 10X,'TYPE:'/)
69500                ACCEPT *,IT
69600                PRINT 1095,IT
69700      1095      FORMAT(/10X,I2)
69800                IF(IT .EQ.1) GO TO 1130
69900                IF(IT.EQ.2) GO TO 1170
70000      C         ------------------------------------------------
70100      C         Give all possible altenatives for taking decision
70200      C         ------------------------------------------------
70300                TYPE 1100
70400                PRINT 1100
70500      1100      FORMAT(15X,'BASE',1X,'TYP OF AC',1X,
70600                1 'AMN TYP',1X,'NO OF AC'/)
70700                DO 1120 J1=1,5
70800                DO 1120 J2=1,5
70900                DO 1120 J3=1,5
71000                IF (OPTION (MM,J1,J2,J3).EQ.0) GO TO 1120
71100                TYPE 1110,J1,J2,J3,OPTION(MM,J1,J2,J3)
71200                PRINT 1110,J1,J2,J3,OPTION(MM,J1,J2,J3)
71300      1110      FORMAT(10X,4I8)
71400      1120      CONTINUE
71500                ITMP=MM
71600                CALL DECISN(B,OPTION,ITMP,A)
71700                GO TO 1230
71800      C         ------------------------------------------------
71900      C         Give alternative 'BASE' vise for taking decision
72000      C         ------------------------------------------------
```

```
72100     1130    TYPE 1140
72200             PRINT 1140
72300     1140    FORMAT(/10X,'GIVE BASE NUMBER:'/)
72400             ACCEPT *, IBN
72500             PRINT 1145,IBN
72600     1145    FORMAT(/10X,I2)
72700             TYPE 1100
72800             PRINT 1100
72900             DO 1150 J2=1,5
73000             DO 1150 J3=1,5
73100             IF (OPTION(MM,IBN,J2,J3).EQ.0) GO TO 1150
73200             TYPE 1110,IBN,J2,J3,OPTION(MM,IBN,J2,J3)
73300             PRINT 1110,IBN,J2,J3,OPTION(MM,IBN,J2,J3)
73400     1150    CONTINUE
73500             TYPE 1160
73600             PRINT 1160
73700     1160    FORMAT(/10X,'WOULD YOU LIKE TO SEE ANOTHER BASE ?'/)
73800             CALL CHOICE(RESLT)
73900             IF (RESLT.EQ..TRUE.) GO TO 1130
74000             MTMP=MM
74100             CALL DECISN(B,OPTION,MTMP,A)
74200             GO TO 1230
74300     C       ------------------------------------------------
74400     C       Give alternative "AIRCRAFTWISE" for taking decision
74500     C       ------------------------------------------------
74600     1170    TYPE 1180
74700             PRINT 1180
74800     1180    FORMAT(/10X,'GIVE AIRCRAFT TYPE:'/)
74900             ACCEPT *,IACT
75000             PRINT 1185,IACT
75100     1185    FORMAT(/10X,I2)
75200             TYPE 1100
75300             PRINT 1100
75400             DO 1190 J1=1,5
75500             DO 1190 J3=1,5
75600             IF (OPTION(MM,J1,IACT,J3).EQ.0) GO TO 1190
```

```
72100     1130    TYPE 1140
72200             PRINT 1140
72300     1140    FORMAT(/10X,'GIVE BASE NUMBER:'/)
72400             ACCEPT *, IBN
72500             PRINT 1145,IBN
72600     1145    FORMAT(/10X,I2)
72700             TYPE 1100
72800             PRINT 1100
72900             DO 1150 J2=1,5
73000             DO 1150 J3=1,5
73100             IF (OPTION(MM,IBN,J2,J3).EQ.0) GO TO 1150
73200             TYPE 1110,IBN,J2,J3,OPTION(MM,IBN,J2,J3)
73300             PRINT 1110,IBN,J2,J3,OPTION(MM,IBN,J2,J3)
73400     1150    CONTINUE
73500             TYPE 1160
73600             PRINT 1160
73700     1160    FORMAT(/10X,'WOULD YOU LIKE TO SEE ANOTHER BASE ?'/)
73800             CALL CHOICE(RESLT)
73900             IF (RESLT.EQ..TRUE.) GO TO 1130
74000             MTMP=MM
74100             CALL DECISN(B,OPTION,MTMP,A)
74200             GO TO 1230
74300     C       ------------------------------------------------
74400     C       Give alternative "AIRCRAFTWISE" for taking decision
74500     C       ------------------------------------------------
74600     1170    TYPE 1180
74700             PRINT 1180
74800     1180    FORMAT(/10X,'GIVE AIRCRAFT TYPE:'/)
74900             ACCEPT *,IACT
75000             PRINT 1185,IACT
75100     1185    FORMAT(/10X,I2)
75200             TYPE 1100
75300             PRINT 1100
75400             DO 1190 J1=1,5
75500             DO 1190 J3=1,5
75600             IF (OPTION(MM,J1,IACT,J3).EQ.0) GO TO 1190
```

```
75700                TYPE 1110,J1,IACT,J3,OPTION(MM,J1,IACT,J3)
75800                PRINT 1110,J1,IACT,J3,OPTION(MM,J1,IACT,J3)
75900      1190      CONTINUE
76000                TYPE 1200
76100                PRINT 1200
76200      1200      FORMAT(/10X,'WOULD YOU LIKE TO SEE OTHER AIRCRAFT ?',
76300                CALL CHOICE(RESLT)
76400                IF (RESLT.EQ. .TRUE.) GO TO 1170
76500                MTMP=MM
76600                CALL DECISN(B,OPTION,MTMP,A)
76700                GO TO 1230
76800      1210      TYPE 1220
76900      1220      FORMAT(/10X,'SORRY TARGET CAN NOT BE HIT BECAUSE OF
77000                1 AIRCRAFT AND AMMUNATION'/)
77100      1230      CONTINUE
77200      1240      TYPE 1250
77300      1250      FORMAT(/10X,'NEXT DEMAND REQUIRED ? TYPE YES/NO'/)
77400                CALL REPLY (ANS)
77500                IF (ANS.EQ.'Y')GO TO 190
77600                PRINT 1260
77700      1260      FORMAT(/10X,'BEST OF LUCK FOR MISSION SELECTED'/)
77800                STOP
77900                END
78000      C     ------------------------------------------------
78100                 SUBROUTINE PRIMAT(AMAT,MAT,IROW,ICOL)
78200                DIMENSION MAT(15,10),AMAT(15,10)
78300                DO 11 I=1,IROW
78400                PRINT 21 ,(AMAT(I,K) ,K=1,10)
78500      C         TYPE 21 ,(AMAT(I,K),K=1,10)
78600                PRINT 31, (MAT(I,J),J=1,ICOL)
78700      C         TYPE 31,(MAT(I,J),J=1,ICOL)
78800      11        CONTINUE
78900      21        FORMAT(//1H+,(10A1))
79000      31        FORMAT(1H+,12X,(6I10))
79100                RETURN
79200                END
```

```
79300      C     ------------------------------------------------
79400      C     SUBROUTINE FOR RANGE CALCULATION
79500            SUBROUTINE RANGE(GR1,GR2,DIST)
79600            INTEGER GR1,GR2,DIST
79700      C     SEPERATE  NORTHING AND EASTING
79800            IX=GR1/1000
79900            IY=GR1-IX*1000
80000            JX=GR2/1000
80100            JY=GR2-JX*1000
80200            ITEMP=((IX-JX)**2+(IY-JY)**2)
80300            DIST=(ITEMP)**0.5
80400            RETURN
80500            END
80600      C     ------------------------------------------------
80700      C     SUBROUTINE FOR INNITIALIISING THE MATRIX
80800            SUBROUTINE INIT(MAT,IROW,ICOL)
80900            DIMENSION MAT(15,10)
81000            DO 12 I=1,IROW
81100            DO 12 J=1,ICOL
81200            MAT(I,J)=0
81300      12    CONTINUE
81400            RETURN
81500            END
81600      C     ------------------------------------------------
81700      C     SUBROUTINE FOR CALCULATION OF TIME
81800            SUBROUTINE CALTIM(PRSNTM,STRKTM,AVALTM)
81900            INTEGER TIME1,TIME2,PRSNTM,STRKTM,AVALTM
82000            IDAY1=PRSNTM/10000
82100            IDAY2=STRKTM/10000
82200            TIME1=PRSNTM-IDAY1*10000
82300            TIME2=STRKTM-IDAY2*10000
82400            IF (IDAY1.EQ.IDAY2) GO TO 13
82500            TIME2=TIME2+2400
82600      13    AVALTM=TIME2 -TIME1
82700            IHRS=AVALTM/100
82800            MIN=AVALTM-IHRS*100-40
```

```
82900                 AVALTM=TIME3*60+MIN
83000                 RETURN
83100                 END
83200       C         ------------------------------------------
83300       C         SUBROUTINE FOR CALCULATING THE MAXIMUM NUMBER
83400       C                 SUBROUTINE CHKMAT
83500                 SUBROUTINE CHKMAX(TEMPMT,MAX,ITOT)
83600                 DIMENSION TEMPMT(20)
83700           24    MAX=1
83800                 DO 14 I=2,ITOT
83900                 IF(TEMPMT(I).LE.TEMPMT(MAX)) GO TO 14
84000                 MAX=I
84100           14    CONTINUE
84200                 RETURN
84300                 END
84400       C         ------------------------------------------
84500
84600       C         SUBROUTINE TO TRANSFER IP ROWS OF PROBMAT INTO
84700       C         1INP ROWS OF NEW PROB MATRIX
84800                 SUBROUTINE TRNSFR (PROB,PNEW,IP,INP)
84900                 DIMENSION PROB(10,6),PNEW(10,6)
85000                 DO 16 I=1,6
85100                 PNEW(INP,I)=PROB(IP,I)
85200           16    CONTINUE
85300                 RETURN
85400                 END
85500       C         ------------------------------------------
85600       C         SUBROUTINE TO FIND THEBASES FROM WHERE STRIKE
85700       C         1 IS POSSIBLE
85800                 SUBROUTINE CHKBSE(MATRIX,ISTRKE,TYPAC,NOBASE)
85900                 INTEGER MATRIX(5,5),ISTRKE(5),TYPAC,NOBASE
86000                 DO 52 I=1,NOBASE
86100                 IF(ISTRKE(I).EQ.1) GO TO 52
86200                 DO 51 J=1,TYPAC
86300                 IF(MATRIX(J,I).EQ.0) GO TO 51
86400                 ISTRKE(I)=1
```

```
86500                GO TO 51
86600          51    CONTINUE
86700          52    CONTINUE
86800                RETURN
86900                END
87000          C     ------------------------------------------------
87100          C     SUBROUTINE FOR INIT PROCEDURE
87200                SUBROUTINE INIT5(MATRIX,ICOL,IROW)
87300                INTEGER MATRIX(5,5)
87400                DO 71 INTROW=1,5
87500                DO 71 INTCOL=1,5
87600          71    MATRIX(INTROW,INTCOL)=0
87700                RETURN
87800                END
87900          C     ------------------------------------------------
88000          C     SUBROUTINE FOR GETTING REPLY   YES/NO
88100                SUBROUTINE REPLY(ANS)
88200                ANS='N'
88300                ACCEPT 81,ANS
88400          81    FORMAT(A1)
88500                RETURN
88600                END
88700          C     ------------------------------------------------
88800          C     SUBROUTINE TO FIND TARGET FROM DEMAND MATRIX
88900                SUBROUTINE FNDTGT(DEMAND,PRIOTY,NOFTGT,IROWNO)
89000                DIMENSION DEMAND(10,5)
89100                INTEGER PRIOTY,IROWNO,NOFTGT
89200                DO 531 J=1,NOFTGT
89300                IROW=IFIX(DEMAND(J,5))
89400                IF (IROW.NE.PRIOTY) GO TO 531
89500                IROWNO=J
89600                GO TO 532
89700          531   CONTINUE
89800          532   RETURN
89900                END
90000          C     ------------------------------------------------
```

```
90100      C      TO HAVE CHOICE OF AC OR AMN
90200             SUBROUTINE CHOICE(RESLT)
90300             LOGICAL ANS,RESLT
90400             CALL REPLY(ANS)
90500             RESLT=.FALSE.
90600             IF (ANS.EQ.'Y') RESLT=.TRUE.
90700             RETURN
90800             END
90900      C      ---------------------------------------
91000      C      SUBROUTINE TO TAKE DECISION FROM ALTERNATIVES
91100             SUBROUTINE DECISN(B,OPTION,MM,A)
91200             INTEGER B(15,5),OPTION(10,5,5,5),MM,A(15,5)
91300      89     TYPE 81
91400             PRINT 81
91500      81     FORMAT(/10X,'GIVE YOUR SOLUTION'//10X,
91600             1 'STRIKE FROM'//10X,'BASE:'/)
91700             ACCEPT *,IBASE
91800             PRINT 810 ,IBASE
91900      810    FORMAT (/10X,I2)
92000             TYPE 82
92100             PRINT 82
92200      82     FORMAT(/10X,'TYPE OF AIRCRAFT'/)
92300             ACCEPT *,ITAC
92400             PRINT 820,ITAC
92500      820    FORMAT(/10X,I2)
92600             TYPE 83
92700             PRINT 83
92800      83     FORMAT(/10X,'TYPE OF AMMUNATION'/)
92900             ACCEPT *,ITAMN
93000             PRINT 840,ITAMN
93100      840    FORMAT(/10X,I2)
93200             ITEMP=OPTION(MM,IBASE,ITAC,ITAMN)
93300             IF (ITEMP.NE.0) GO TO 831
93400             TYPE 830
93500      830    FORMAT(/10X,'WRONG DECISION-GIVE CORRECT SOLUTION'/)
93600             GO TO 89
```

```
                  IF (ITEMP.GT.B(5+ITAC,IBASE)) GO TO 84
                  IF ((A(ITAMN,ITAC)*ITEMP).GT.B(10+ITAMN,IBASE)) GO TO
                  B(5+ITAC,IBASE)=B(5+ITAC,IBASE)-ITEMP
                  B(10+ITAMN,IBASE)=B(10+ITAMN,IBASE)-(A(ITAMN,ITAC)*IT
                  GO TO 88
            84    TYPE 86
94300       86    FORMAT(/10X,'AMMUNATION ALREADY ALLOTED'/)
94400             GO TO 89
94500       85    TYPE 87
94600       87    FORMAT(/10X,'AIRCRAFT ALREADY ALLOTED'/)
94700             GO TO 89
94800       88    RETURN
94900             END
95000       C     ------------------------------------------------------------
```

APPENDIX E

ABBRIBIATIONS USED

BN - Battalion

BRIG - Brigade

CP - Communication Personal

CRP - Control and Reporting Point

DIV - Division

FAC - Forward Air Controller

FACP - Forward Air Controller Point

FCSC - Fire Control Supporting System

GLO - Ground Liasion Officer

JOC - Joint Operation Center

JTF - Joint Task Force

NOT - Number of targets

POH - Priority of hit

RP - Reporting Point

TACC - Tactical Air Control Center

TS - Target Strength

TTV - Target Total Value

VOT - Value of Target